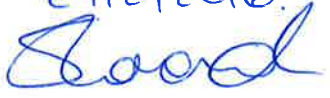
Northparkes Mines

Annual Environmental Management Report

January 2015 – December 2015

Name of Mine	Northparkes Mines
Name of Leaseholder and Mine Operator	CMOC Mining Limited
Mining Leases	ML 1247, ML 1367 and ML1641
Environnent Protection Licence	EPL 4784
Development Consent	PA 11_0060 including Mod 1
MOP Commencement Date	13th May 2015
MOP Completion Date	13th May 2020
AEMR Commencement Date	1st January 2015
AEMR Completion Date	31st December 2015

Reviewed by	
Title	Stacey Kelly, Manager -People, Safety & Environment
Date	29/2/16
Signature	
Approved by	
Title	Stefanie Loader, Managing Director
Date	29/2/2016.
Signature	

Executive Summary

Northparkes Mines (Northparkes) is a copper and gold mine located 27 kilometres North West of Parkes in central west New South Wales, Australia. Northparkes is a joint venture between China Molybdenum Co., Ltd (CMOC) (80 percent) and the Sumitomo Groups (20 percent).

In addition to mine and mineral process activities, Northparkes farms the bulk of its 6,481 ha landholding, including a significant portion of the 3,400 ha within its three existing mining leases. The farms use best practice sustainable farming methods, which are constantly adapted to maximise productivity and quality, whilst conserving water and soils.

The Northparkes Step Change Project was approved with conditions by State and Federal regulators in 2014. Included in these approvals was an extension of the mine life to 2032, construction of new tailings storage facility (TSF), two new open cuts and associated infrastructure.

This Annual Environmental Management Report (AEMR) details the mining operations, production, and environmental management and community relations for Northparkes during the 2015 calendar year. Additionally, this AEMR will outline any changes from the current Mine Operations Plan (MOP).

Operations during the Reporting Period

Northparkes operates two underground ore bodies, E26 and E48 to access copper sulphide porphyry ore bodies using the block cave mining method. Northparkes was the first Australian mine to use block caving as its mining method at E48 ore body. No mining is currently undertaken at E26 ore body.

A total of 6.35 Mt of sulphide ore was processed in 2015 from E48 underground ore body. Copper-gold concentrate production totalled 151,518 tonnes. Mill upgrade projects were carried out with the installation of a new grinding circuit which included two separate modules (known as Mod 1 and Mod 2), each incorporating a Semi Autogenous Grinding (SAG) mill, oversize crushing technology, two stages of ball milling and froth floatation.

Construction of the Rosedale TSF commenced in March 2015 along with the construction of the new site access road which included stripping of 770,000m^3 of topsoil from the Rosedale TSF footprint. Both of these milestones have been completed with the new site access road, known as Northparkes Way, opened on the 29th of September and the topsoil stripping completed in October.

Environmental Performance

Environmental monitoring is a key component of Northparkes operation. A summary of the environmental monitoring undertaken at Northparkes in 2015 is provided below:

- Air Quality – dust deposition monitoring results were under the criteria required by the Project Approval for total suspended particulates (TSP). There was one exceedance for PM10 (real-time monitoring) during the reporting period and nine exceedances for depositional dust results. Investigations concluded that the dust exceedance was due to localised farming activities and was not from mining activities.
- Surface Water – the overall water quality of surface water and ground water remained consistent within long-term averages. There were fluctuations observed in the surface water and groundwater quality, which is largely attributable to less sediments due to low rainfall during the reporting period.

- Ground Water – groundwater levels and quality remained constant at all monitoring bores during the reporting period and are in line with long-term averages. Over the last 10 years, the groundwater levels at all bores have increased more than 2m due to higher rainfall and high infiltration rates.
- Flora and Fauna – a range of flora and fauna surveys were undertaken in 2015, including assessments as part of the Rosedale Project as well as surveys at the Kokoda Offset Site. Ecological surveys undertaken in 2015 included: preclearance and clearing supervision surveys for the Rosedale Project, pine donkey orchid population monitoring surveys, landscape function analysis and flora assessments at Kokoda, and winter and spring targeted bird surveys at Kokoda.
- Noise – compliance monitoring (attended noise) occurred in March, June, September and December. During these monitoring periods, no exceedances in operational noise criteria were recorded. No exceedances were recorded through the real time noise monitors.
- Aboriginal and Cultural Heritage – no salvage programs were conducted in 2015.
- Blasting – no blasting activities were conducted in 2015.
- Rehabilitation - Northparkes has been working with the Centre for Mine and Land Rehabilitation (CMLR), based at the University of Queensland, on a series of studies associated with the rehabilitation of TSFs. The study involves setting up four 20m X 20m trial plots with different widths and mixtures of capping materials over the tailings. In each of these trial plots different arrays of suction plates, suction sensors and moisture sensors have been installed.
- Other Issues and Risks - environmental risks associated with Northparkes' operations are recorded in the Environmental Aspects and Impacts Register.
- Meteorological Monitoring - total annual rainfall was 421.8 millimetres. Temperatures were consistent with the previous year. Wind speeds generally remained between 0 and 5m/sec. The dominant wind directions remained North-East and South-East.
- Community and External Relations - Northparkes engages directly and regularly with the local community to understand community concerns or issues, and to keep the community updated on activities relating to Northparkes' operations. In 2015, Northparkes continued to provide assistance to local community organisations in the form of in-kind support via the Northparkes Community Volunteer Leave Program and financial assistance via the Community Investment Program. Northparkes contributed x hours of volunteering to community programs and $381,000 was invested in various sporting, educational, cultural, environmental and agricultural programs in 2015. One community complaint was received in 2015.

Year in Review 2015

	2014	*2015*	*2016 (Plan)*
General			
Government fines	0	0	0
Reportable incidents	9	16	0
Legal compliance	✓	✓	✓
ISO 14001 certification	✓	✓	✓
Mining			
Concentrate production (t)	169,376	151,518	156,916
F/T employment level	324	324	NA
Total land clearance (ha)	2.8	45	10
Total land rehabilitation (ha)	0	0.00	20
Community			
Complaints	2	1	0
Main complaint issue	Dust/Traffic	Traffic	NA
CCC meetings	1	1	2
Investments ($)	457,150	381,000	NA

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INTRODUCTION

A summary of Northparkes' operations, setting and localised weather conditions experienced during the reporting quarter.

1.1 Scope

The Annual Environmental Management Report (AEMR) details the environmental performance of Northparkes from 1 January 2015 – 31 December of 2015 and outlines proposed actions for the next reporting period. The AEMR applies to Northparkes' activities being undertaken on Mining Leases (ML) 1247, 1367, 1641 and Goonumbla Rail Siding.

The AEMR has been prepared in accordance with the NSW Department of Trade & Investment (DTI) "ESG3: Mining Operations Plan (MOP) Guidelines September 2014" and Project Approval Schedule 6, Condition 4 which states:

"By the end of March each year, or as otherwise agreed by the Secretary, the Proponent shall review the environmental performance of the project to the satisfaction of the Secretary".

Compliance against conditions stated in the Project Approval (11_0060), including Modification 1 (Appendix 1) are required to be reported in the AEMR and are therefore included in this document.

Northparkes recognises and respects the importance of stakeholders and considers positive relationships as important to aid continual improvement of its environmental management practice. This report is therefore provided to the following stakeholders:

- Department of Industry Resources and Energy (DRE)
- Department of Planning and Environment (DPE)
- Department of Primary Industries – Water (DPI)
- Parkes Shire Council (PSC)
- NSW Office of Environment and Heritage (OEH)
- NSW Environment Protection Agency (EPA)
- Peak Hill Local Aboriginal Land Council (PHLALC)
- Wiradjuri Council of Elders (WCE)
- Northparkes Community Consultative Committee
- General public (available at www.Northparkes.com.au)

1.1.1 Location, history and process overview

Northparkes copper-gold mine is located 27 kilometres north north-west of the town of Parkes in central west New South Wales, Australia (Figure 1). On 1st December 2013, Rio Tinto Limited divested its 80 per cent interest in Northparkes to China Molybdenum Pty Limited (CMOC). The Northparkes business continues to run under a joint venture arrangement, with the remaining 20 percent share owned by the Sumitomo Group.

The majority of Northparkes employees reside in the Parkes Shire, which has a population of approximately 15,000 residents. Parkes Shire is a diverse municipality centred in the town of Parkes. It is primarily a farming based community with other industries such as transport and mining bringing economic diversity.

Northparkes is an open cut and underground operation, however the open cut mines have been economically exhausted and operations of these pits ceased in 2010. The two underground ore bodies, E26 and E48, access copper sulphide porphyry ore bodies using the block cave mining method. Northparkes was the first Australian mine to use block caving as its mining method.

Mining of the E26 orebody occurred in two stages: Lift 1 and Lift 2 with an extension to the north as grades permitted. Production in E26 ended in 2007 with the E48 orebody in full production from 2008.

Ore is transported to surface where it is processed through a semi-autogenous grinding (SAG) circuit and associated floatation process. The copper concentrate slurry is filtered through ceramic discs, loaded into sealed containers and transported to Port Kembla from Goonumbla Rail Siding. By-products from the ore processing facility are stored in the onsite Tailings Storage Facilities.

In addition to mine and mineral process activities, Northparkes farms the bulk of its 6,481 ha landholding, including a significant portion of the 3,400 ha within its three existing mining leases. The land is farmed using best practice conservation farming methods developed and adopted to maximise productivity and quality, while conserving water and soils.

In July 2014, The Northparkes Mine Step Change Project (the Project) was approved with conditions by the Department of Planning and Environment.

The key elements of the Step Change Project include:

- Continue block cave mining in E48 and E26
- Develop and block cave mine the E22 resources
- Campaign open cut mining in five potential resources
- Amendments to the configuration of TSFs including
- Continue to place tailings in the existing TSFs (TSF1, TSF2 and Estcourt) to a height of 28m
- Develop new waste dumps to accommodate new open cuts, waste rock from these dumps can be utilised in the development of TSF3
- Continue ore processing infrastructure up to 8.5Mtpa capacity and road haulage of copper concentrate to Goonumbla siding
- Continue to use existing site administration, mining and water supply infrastructure
- Develop an amended access road, new visitors parking and access control
- Continue approved mining operations for an additional seven years until the end of 2032
- Rehabilitation and closure of the site after the end of the project life in accordance with relevant legislation

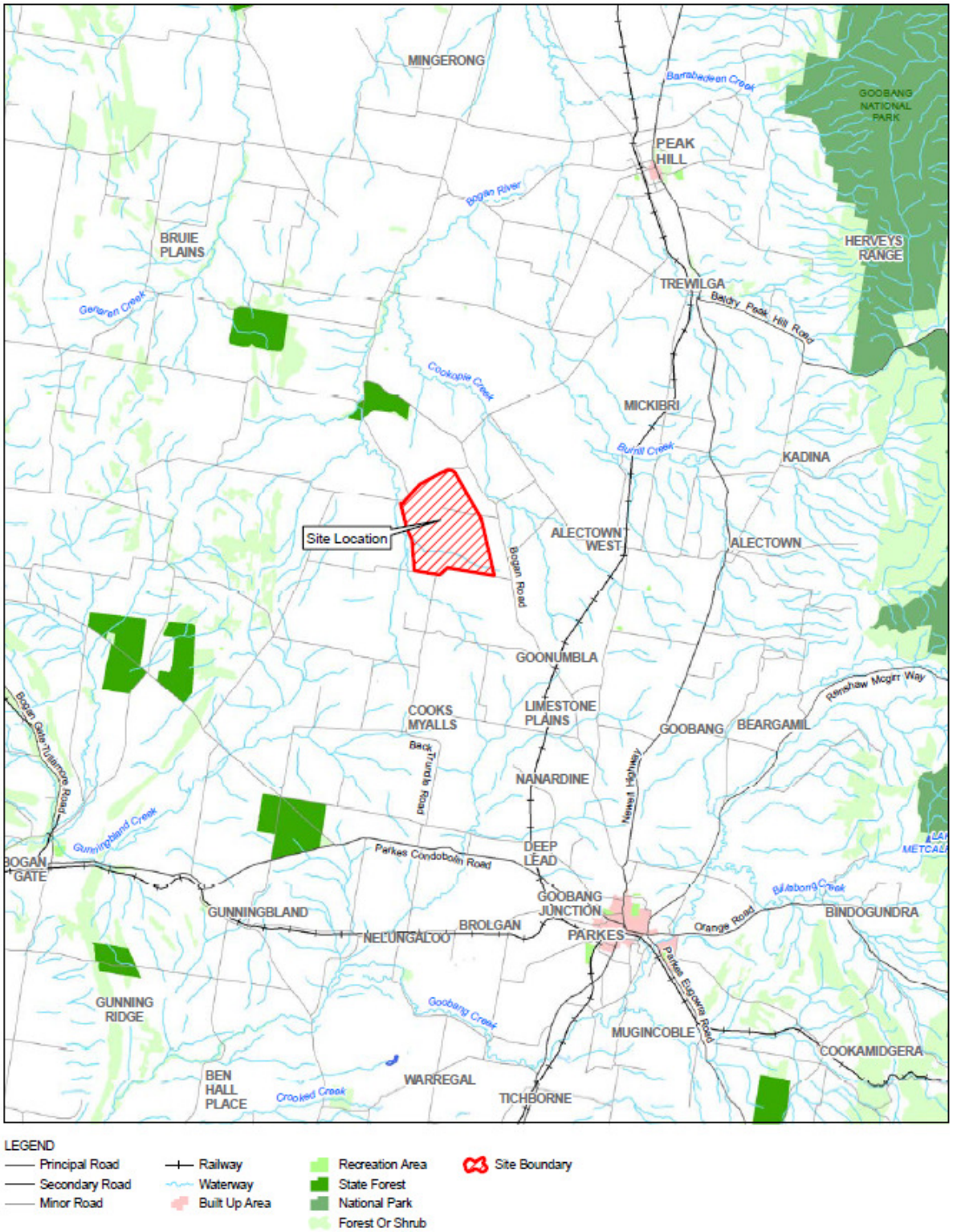


Figure 1 Regional Proximity

1.1.2 Site layout and infrastructure

Surface infrastructure and operation layout is shown in Figure 2.

Onsite infrastructure includes:

- Two former open cut pits E22 and E27, surrounded by ore stockpiles, waste rock dumps and a sound bund
- Tailings Storage Facilities: TSF1, TSF2 and Estcourt
- The E26 and E48 underground block cave mine and resultant surface subsidence zone.
- Underground mining fixed plant infrastructure including two crushers, maintenance workshops and materials handling conveyor system
- Surface mining related infrastructure such as the portal, hoisting shaft, ventilation fans, transfer and overland conveyor, mining offices and contractor laydown areas
- Marginal ore stockpiles, waste rock dumps and stockpiles of clay and oxide material are located around the surface subsidence zone outside the predicted subsidence limits
- The processing plant including surface crusher, crushed ore stockpiles, active grinding mills, froth flotation area, concentrate filtration and storage bays and tailings storage facilities
- Service infrastructure including administration building and change rooms, core shed, metallurgical laboratory, emergency response shed, warehouse, workshop, electrical infrastructure, surface contractor lay down areas and associated roads
- Goonumbla rail siding infrastructure including fuel dispensing facilities and portable amenities
- Farm infrastructure includes bulk storage sheds, workshop and grain silos

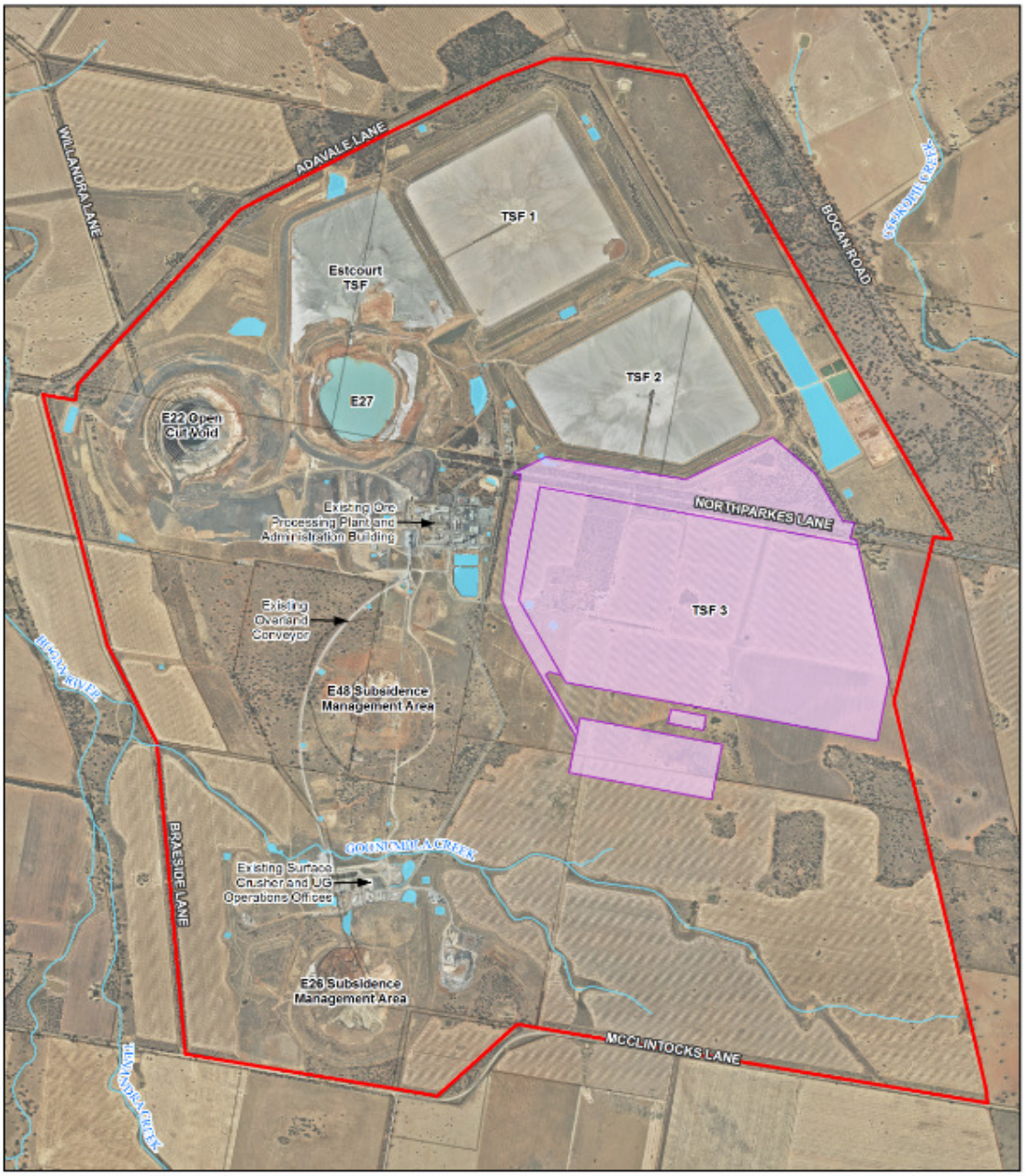


Figure 2 Operational Layout

1.2 Contents, leases and licences

Northparkes has a large number of statutory approvals and associated legal obligations that regulate its mining related activities onsite. The status of Northparkes' main statutory approvals are listed in Table 1.

Leases and licences were transferred as part of the transfer in ownership. Further discussion of Northparkes compliance with its legal requirements is outlined in Section 5.

Table 1 Summary of Licences

Approval	Description	Issue Date
ML 1247	Mining Lease (1629.6 ha)	27/11/1991
ML1367	Mining Lease (826.2 ha)	21/03/1995
ML1641	Mining Lease (24.4 ha)	25/03/2010
EL 5800	Exploration Lease (245 km^2)	08/01/2001
EL 5801	Exploration Lease (495 km^2)	08/01/2001
EL 5323	Exploration Lease (218 km^2)	18/07/1997
PA11_0060	Project Approval – Step Change Project (Mine Extension)	16/07/2014
PA11_0060 Mod 1	Modification to include Sub Level Cave Mining	
EPBC 2013/6788	EPBC Approval	13/02/2014
	PSC Approval for Road Train Access on Bogan Road	19/11/1999
EPL 4784	Environmental Protection Licence	30/05/2001
35/02983	Dangerous Goods Notification	-
07-100146-001	Licence to Store (Explosives)	27/07/2009
70WA600026	Joint Water Supply Works	01/07/2004
70AL600028	Water Access Licence 8241	01/07/2004
70AL603187	Water Access Licence 10082	18/10/2005
70BL226550	Bore Licence (Mining, Irrigation, Stock and Domestic)	01/07/2008
70BL230929	Bore Licence (Mining and Irrigation) – Bore 7	10/07/2009
70BL229975	Bore Licence (Domestic and Stock)	26/07/2004
70BL226584	Bore Licence (Mining) – Bore 8	27/05/2008
80BL356559	Bore Licence (Dewatering – Mining) – E26 and E48	18/01/2010
80BL245449	Bore Licence (Dewatering – Mining) – E22	18/01/2010
80BL245450	Bore Licence (Dewatering – Mining) – E27	18/01/2010
DA2009/0057	Development Consent (Forbes Water Pipeline)	19/03/2009
HD 48307	Limestone State Forest Occupation Permit	24/11/2015

1.2.1 Amendments over the reporting period

1.1.1.1 Project Approval

The project approval 11_0600 was granted on 16 July 2014. In conjunction with this project approval the Environmental Protection and Biodiversity Conservation (EPBC) Act 1999 approval for Northparkes was also granted on the 13 February 2014. A modification submitted to the existing Project Approval (PA 11_0060) was granted by the NSW Department of Planning and Environment (DPE) in the current reporting period to include sub-level cave mining methods.

1.1.1.2 Mining Operations Plan

The new MOP for the period 2015 – 2020 was submitted to the Department of Industry (Resources & Energy) in May 2015. The new MOP has been developed under the guidelines *"ESG3: Mining Operations Plan (MOP) Guidelines, September 2013"*. The new MOP is still awaiting approval from the Department.

1.1.1.3 Environmental Protection Licence"

An Annual Return for the reporting period was submitted to the EPA by May 2015 in accordance with requirements under Environment Protection Licence (EPL) 4784 Condition R1.1.

1.1.1.4 Occupation Permit

There were no applications submitted to, or granted by, Forests NSW to modify the existing Limestone National Forest Occupation Permit in the current reporting period.

1.3 Mining contacts

Herewith current contact details for the current Northparkes Managing Director and Environmental Manager:

Stefanie Loader – Managing Director
Phone: 02 6861 3000
Email: stefanie.loader@Northparkes.com

Stacey Kelly – Manager People, Safety & Environment
Phone: 02 6861 3280
Email: Stacey.kelly@Northparkes.com

1.4 Actions required from previous AEMR review meeting

No actions were raised form the last AEMR Review meeting.

2. BRIEF SUMMARY ON KEY OUTCOMES/ACHIEVEMENTS

Reporting period summary:

- 6.35 million tonnes of ore milled
- 151,518 tonnes of copper concentrate produced

2.1 Mining and development

Open cut

Active open cut mining ceased in 2010. There were no open cut mining activities in the current reporting period.

Underground Operations

Underground mining activities are currently undertaken in ore body E48 using block caving methods. Block Caving is an underground hard rock mining method that involves undermining an ore body, allowing it to progressively collapse under its own weight. It is the underground version of open pit mining. A schematic of the underground mining section is seen in Figure 3.

The operations at E26 orebody ceased in 2008 due to ingress of clay in the drawpoints. The construction of E48 block cave mine was completed in 2010, with the first ore extracted from E48 Lift 1 block cave mine, and is currently in production.

Automation (remote operation of underground load, haul and dump machinery) continued in the reporting period to achieve full automation of underground mine operations. In mid-October 2015, Northparkes confirmed its position as the most automated underground mine in the world and achieved 100 percent automation.

Minimal convergence was seen over the extraction level in 2015. March 2015 was the exception, when the convergence in Extraction Drive Access (EDA) increased significantly. points. Various actions were taken with five draw point's shotcreted to form a plug to stabilise the drive and prevent further convergence.

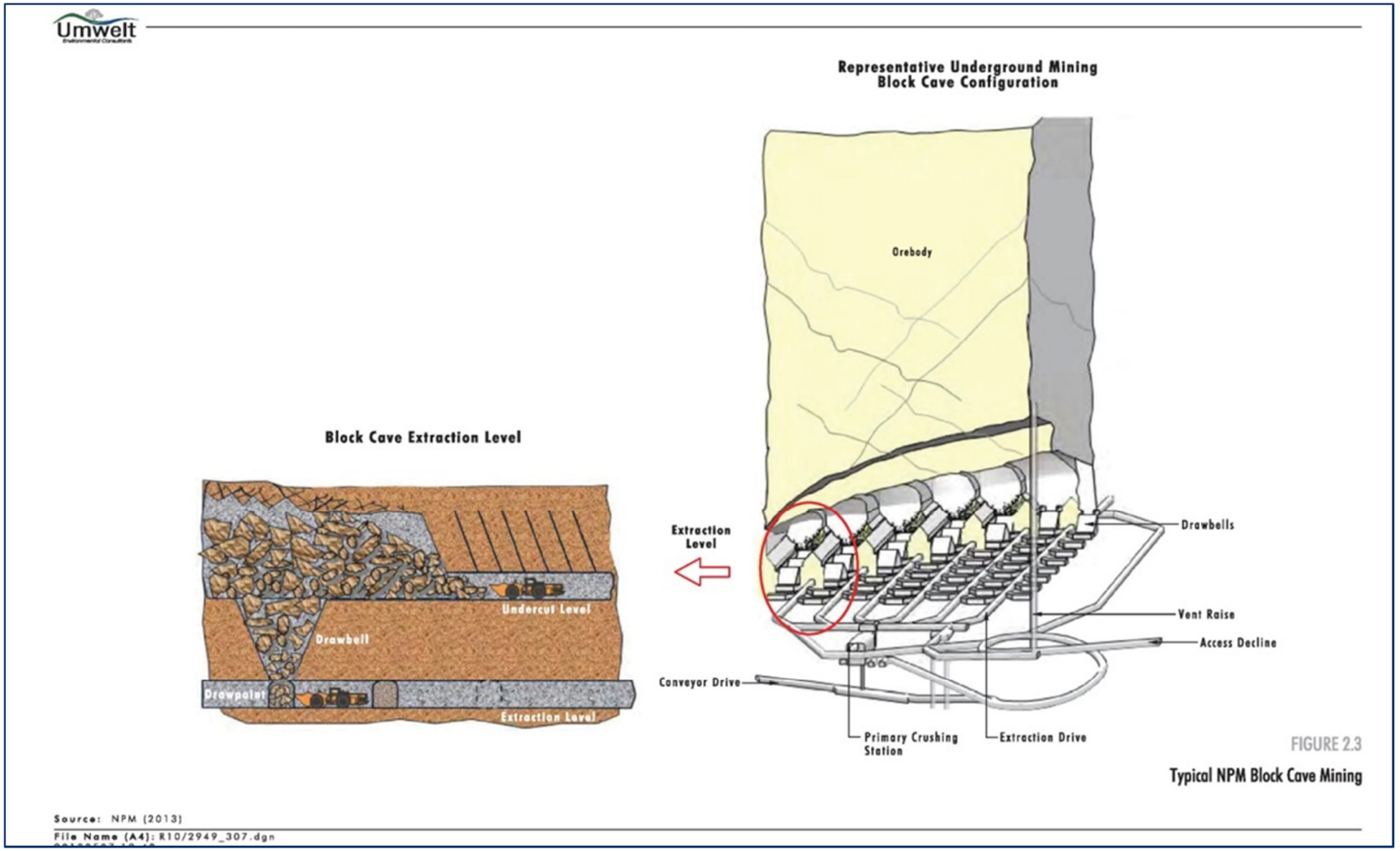


Figure 3 Block Cave Mining Method

2.2 Exploration an resource utilisation

Exploration and evaluation programs continued in the current reporting period, on both the mining and exploration leases. Mining lease evaluation under the proposed E26 Lift 1 North Program was commenced. This drilling involves the evaluation of an area immediately adjacent to the historic E26 Lift 1 cave. The holes drilled as part of this program will also be used for metallurgical test work, down hole geotechnical measurements and for cave monitoring for the life of the proposed cave.

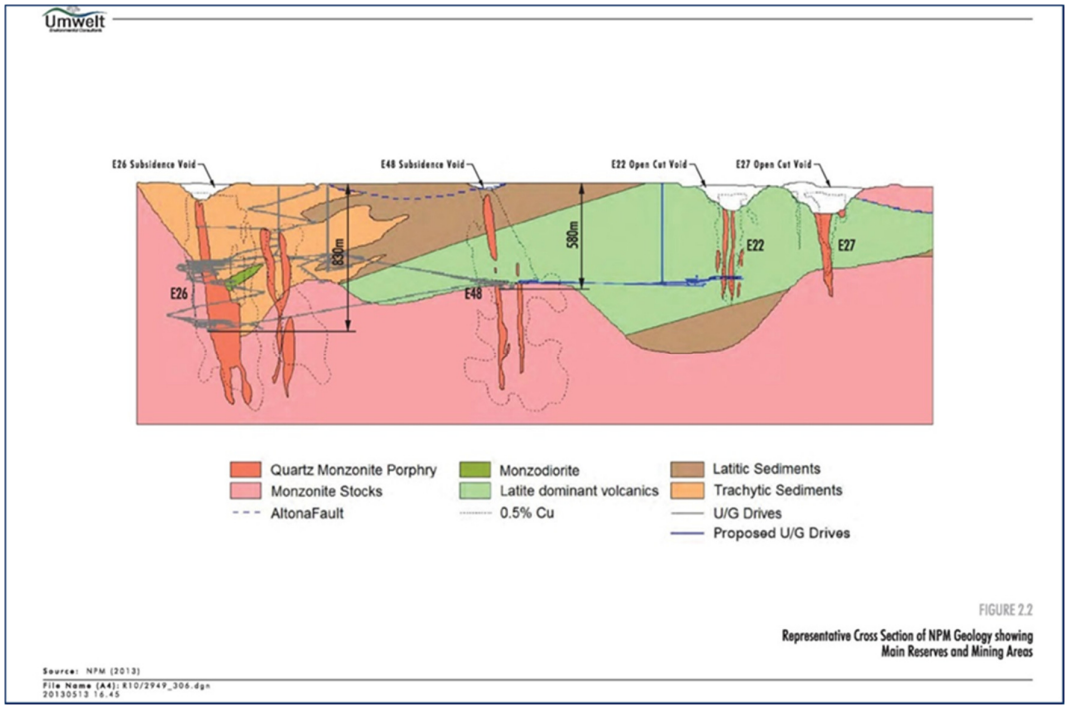


Figure 4 Cross section showing the zones of mineralisation in relation to existing and proposed mine infrastructure

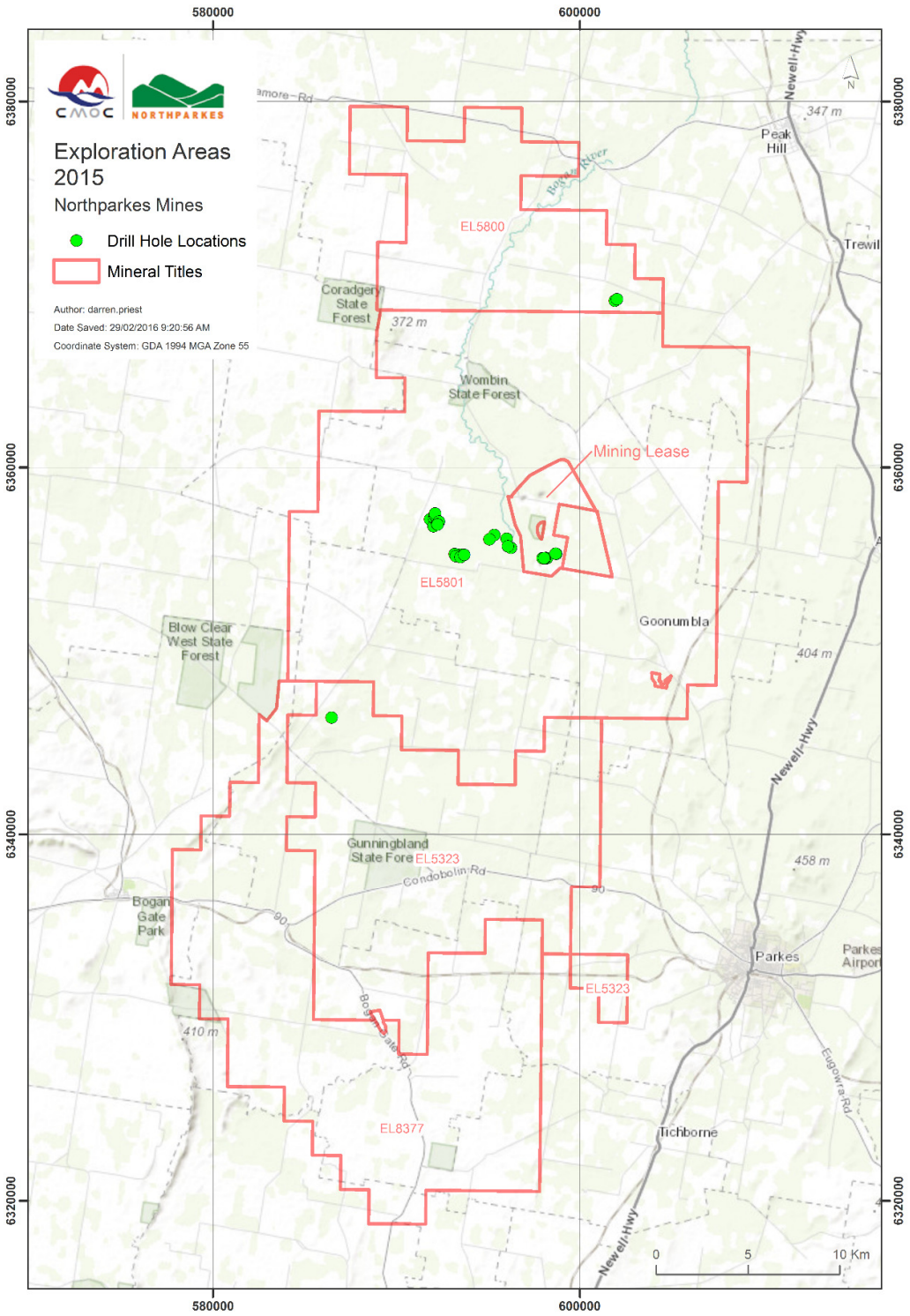


Figure 5 Exploration collar locations

Exploration activities during the period included reverse circulation (RC) and diamond drilling programs. A total of 14,390.7m of surface drilling was completed during the reporting period. NPM is committed to identifying and evaluating new ore bodies with the intention extending the NPM mine life.

Exploration and evaluation activities will continue in the next reporting period. Focus is aimed at supporting feasibility studies of the GRP314 and E26 Lift 1 North deposits, along with follow-up work adjacent to the E44 prospect on Exploration Licence 5323. An aerial magnetic and radiometric survey is scheduled for the next reporting period to cover Exploration Lease 8377. This licence was newly acquired by Northparkes Mines in 2015

2.3 Sub level caving (SLC) mining method

Northparkes has received an approval to undertake sub-level cave mining technique along with the approved Block Cave Mining method.

The SLC mining method is a well-established mass mining method in the international mining industry for narrow ore bodies. The SLC mining method, like block caving, belongs to a group of unsupported extractive mining techniques classed as caving methods. Caving methods rely on the undercutting of an area of rock, and then gradual failure of the overlying rock due to gravity and stress, to minimise mining risk and supply production.

The E26 Sub Level Cave (SLC) project commenced construction in April 2015. The mine design aims to extract a remnant wedge of high grade material adjacent to the E26 Lift 2 Block Cave. The SLC mining method involves construction of the sub level horizon followed by retreat drill and blast of that horizon. The broken material from blasting is recovered as the main source of production. The second sub level horizon is then constructed, as the top down process continues. The E26 SLC Mine consists of three sublevels approximately 20m apart.

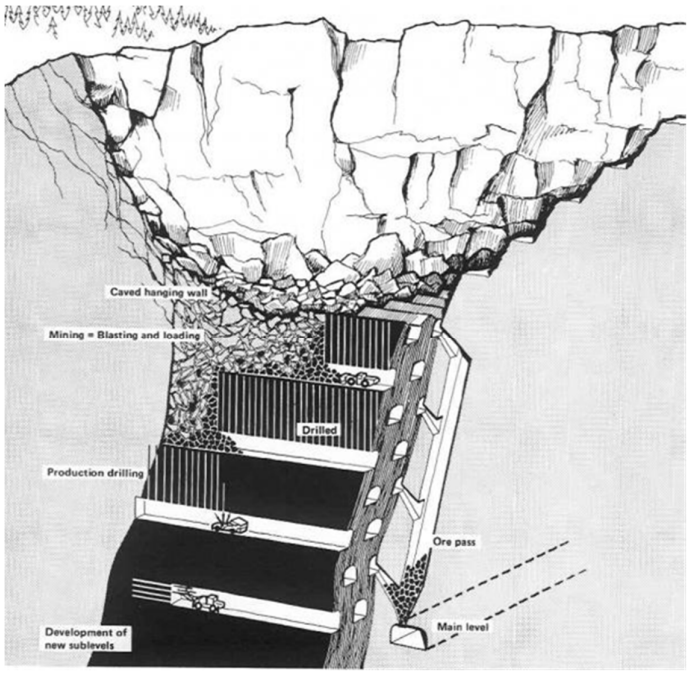


Figure 6 Sub-level cave schematic diagram

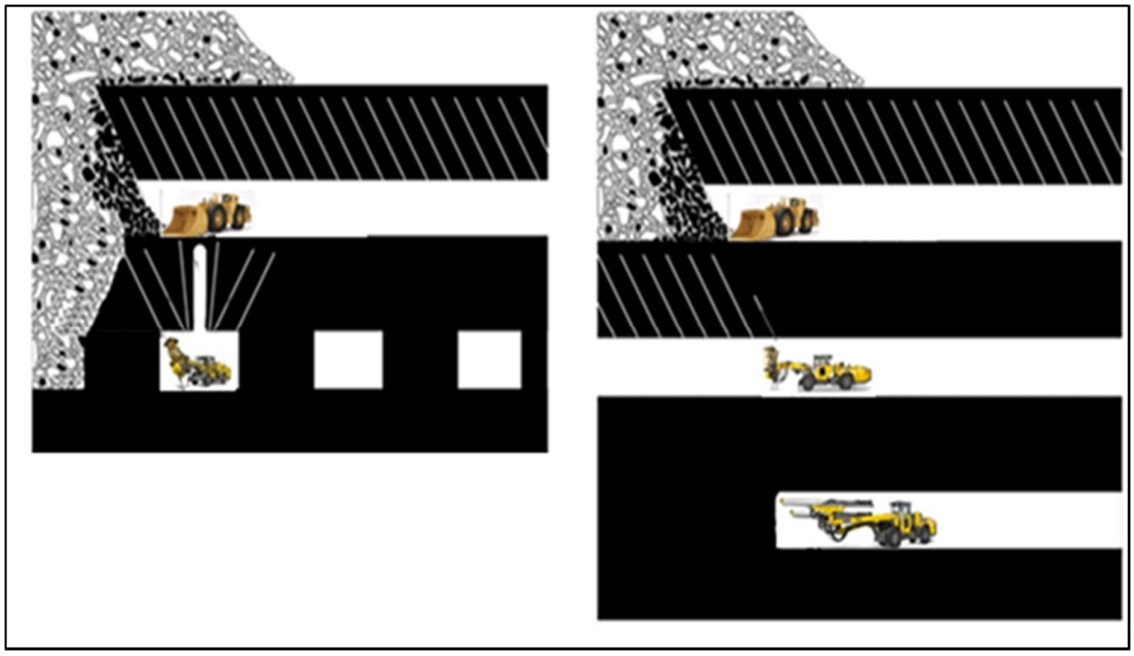


Figure 7 Comparison between Block Caving (left) and SLC (right)

2.4 Ore processing

In 2015, a total of 6.04 Mt of sulphide ore was processed from underground ore body. Copper-gold concentrate production totalled 151.52 kilo-tonnes. This product was predominantly sold to customers in China and Japan.

- Ore processing as shown in the Figure 8 includes a number of defined stages including grinding, floatation and thickening
- The grinding circuit comprises two separate modules (Mod 1 and Mod 2), each incorporating a Semi Autogenous Grinding (SAG) mill, oversize crushing technology, two stages of ball milling and froth floatation.
- The floatation process floats a sulphide concentrate to recover copper and gold bearing minerals. From the floatation, the concentrate is processed through the concentrate thickener and transferred to the storage shed
- The tailings component is pumped from the floatation stage to a tails thickener and then to the TSF.

Table 2 Ore Processing Production

Year	Ore Milled (Mt)	Production Copper Concentrate (t)	Gold (oz)
2011	5.52	146,625	76,004
2012	5.65	155,838	71,799
2013	6.01	168,282	67,162
2014	6.13	169,376	60,080
2015	6.04	151,518	47,319

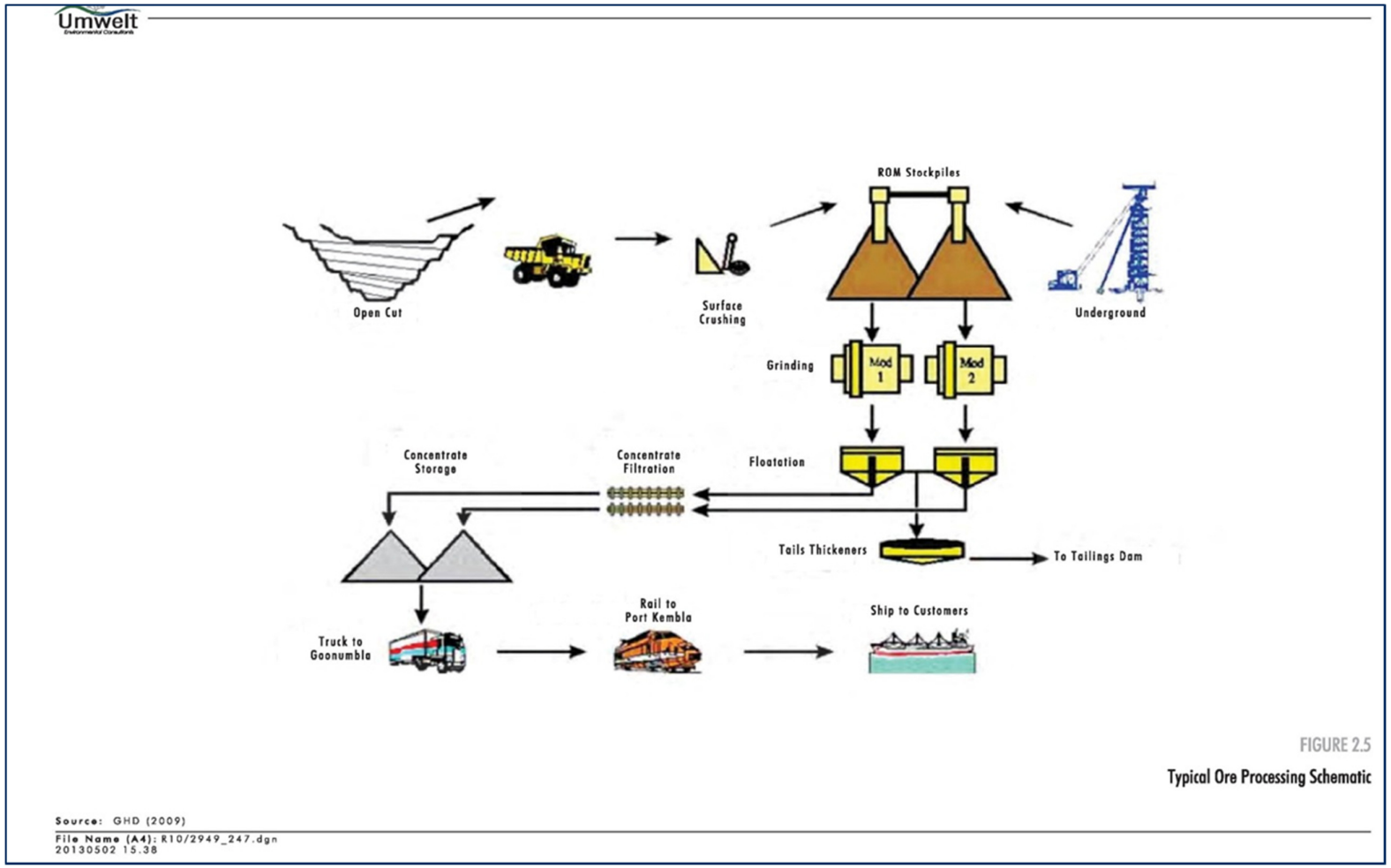


Figure 8 Process-flow schematic for Northparkes Operations

2.5 Rosedale construction project

The Rosedale project involves the construction of a new tailings storage facility, new site access road and associated infrastructure. The Rosedale Tailings Project delivers the first stage of a new tailings facility with 11 months storage capacity initially and life of mine capacity beyond 2030. The project is forecast to be complete in 2016 consistent with the existing Estcourt facility reaching stage 1 capacity.

Construction works commenced in March 2015 with work to support the new site access road and stripping of 770,000m3 of soil from the tailings facility footprint. Both milestones were completed on time, with the opening of the new site access road on 29 September and soil stripping completed in October. Construction of the tailings embankments and drains have commenced with commissioning of the facility in mid-2016.

In 2015, pre-clearance works commenced together with stripping of top and subsoils in the approved disturbance area. A summary completed works are highlighted in Table 3.

Table 3 Rosedale Project works completed

Program	Activity completed
2015	Pre strip of land
	Clearing vegetation
	Demolition of heritage outbuildings
	Construction of new TSF (Rosedale TSF) - embankments
	New site access road
	Relocation of new water and electricity mains

2.5.1 Pre-stripping

Pre-stripping of the land was undertaken in 2015. Topsoil and subsoil was stripped and stockpiled in the approved disturbance area for the project. Topsoil and subsoils are stored in different areas and will be used for closure.

A total of 770,000m3 of soil was stripped and stockpiled from the Rosedale TSF footprint. As nearly half the of the construction time was impacted by wet weather, additional equipment and personell were mobilised to ensure delays in soil stripping did not impact the critical path of the project, with soil stripping completed in October 2015.

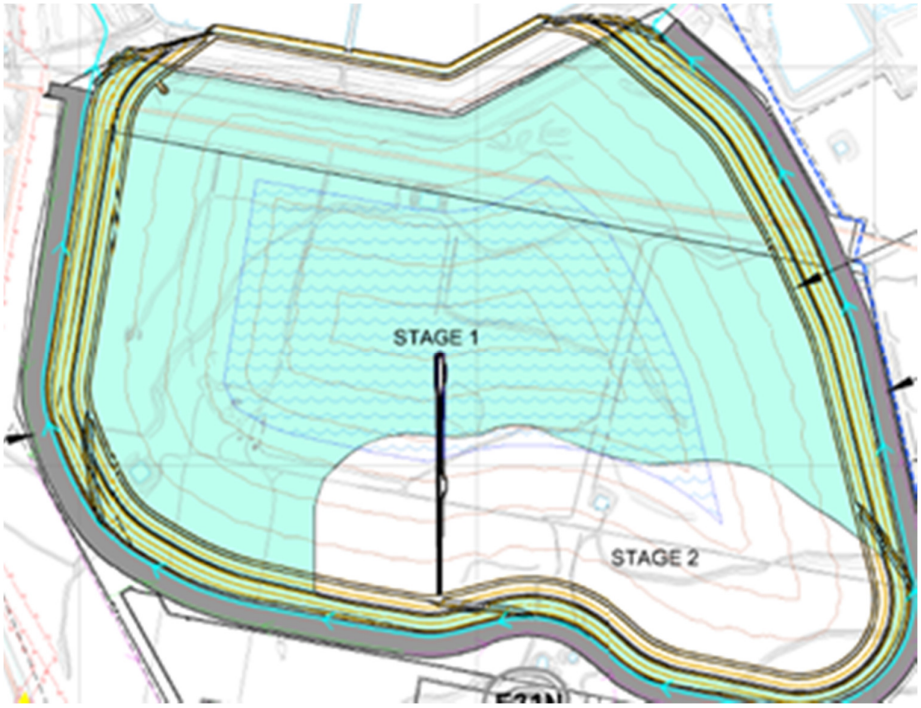


Figure 9 Rosedale TSF Soil Stripped area

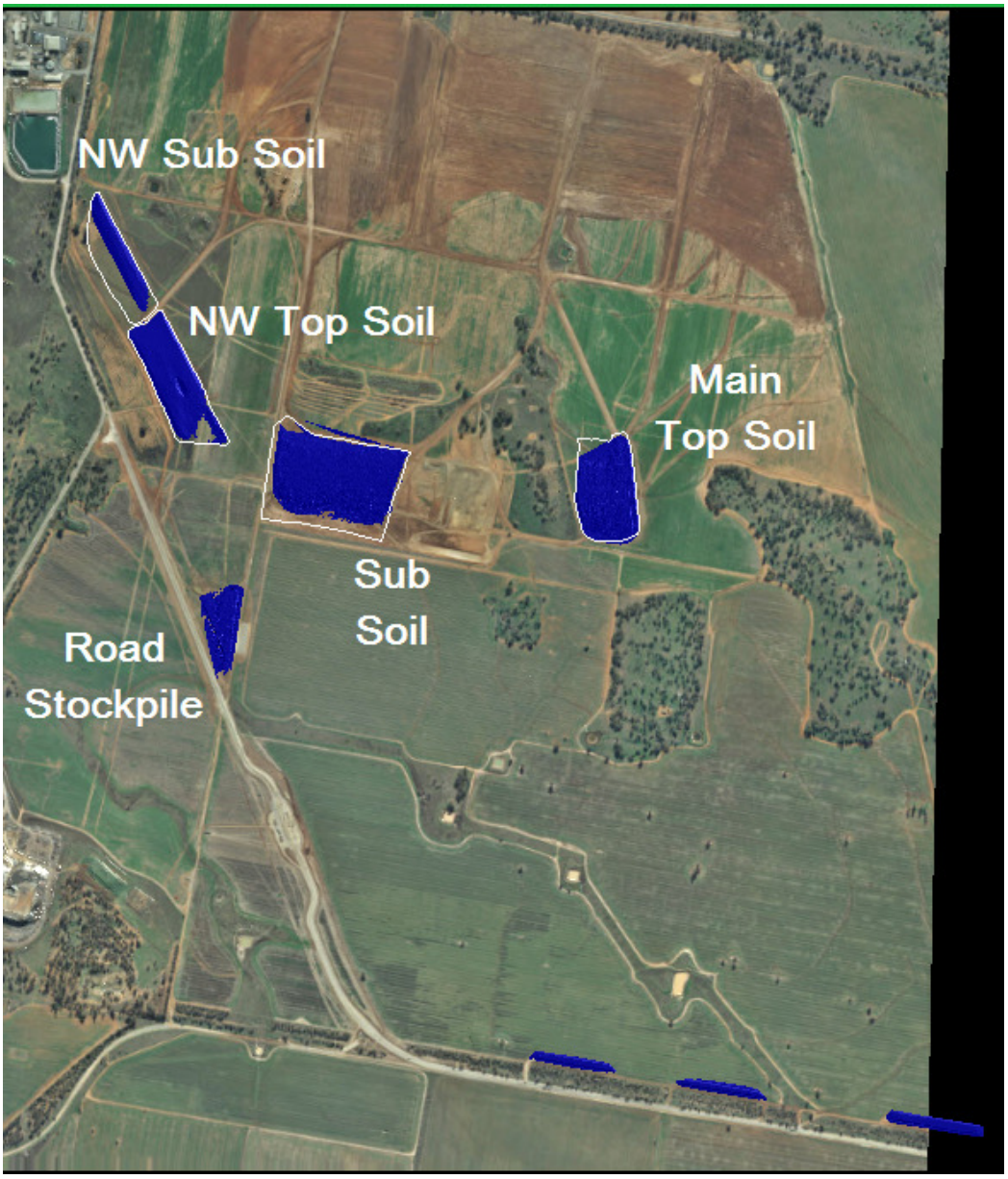


Figure 10 Rosedale TSF Top and Sub-Soil Stockpiles

2.5.2 New site access road

The development of the new Rosedale TSF resulted in the closure of the Northparkes Lane, formerly the principal mine site access. The site access road connects the McClintock's Lane to the existing internal access road between ore processing plant and underground operations offices. (Figure 12)

The new road is approximately 25 metres wide and is a sealed two way road, and all required infrastructure and services corridor along McClintock's Lane, is upgraded to facilitate increased traffic movements resulting from all mine site vehicles (including copper concentrate trucks) accessing site via McClintock's Lane to Bogan Road.

In order to facilitate access to Bogan Road from McClintock's Lane, upgrades to the Bogan Road/ McClintock's Lane intersection were undertaken. This included widening and sealing the existing section of McClintock's Lane between the proposed site access road and Bogan Road.

Onsite car parking for staff will be retained in existing locations, adjacent to site offices. A new access control and visitor car parking facility has been constructed at the intersection of McClintock's Lane.

The new site access road was opened on 29 Septebmer 2015, in line with the original project schedule. A total of 200,000t of road base and 30,000 personnel hours went into the construction of the new access road, with zero injuries.

Figure 11 New site access road

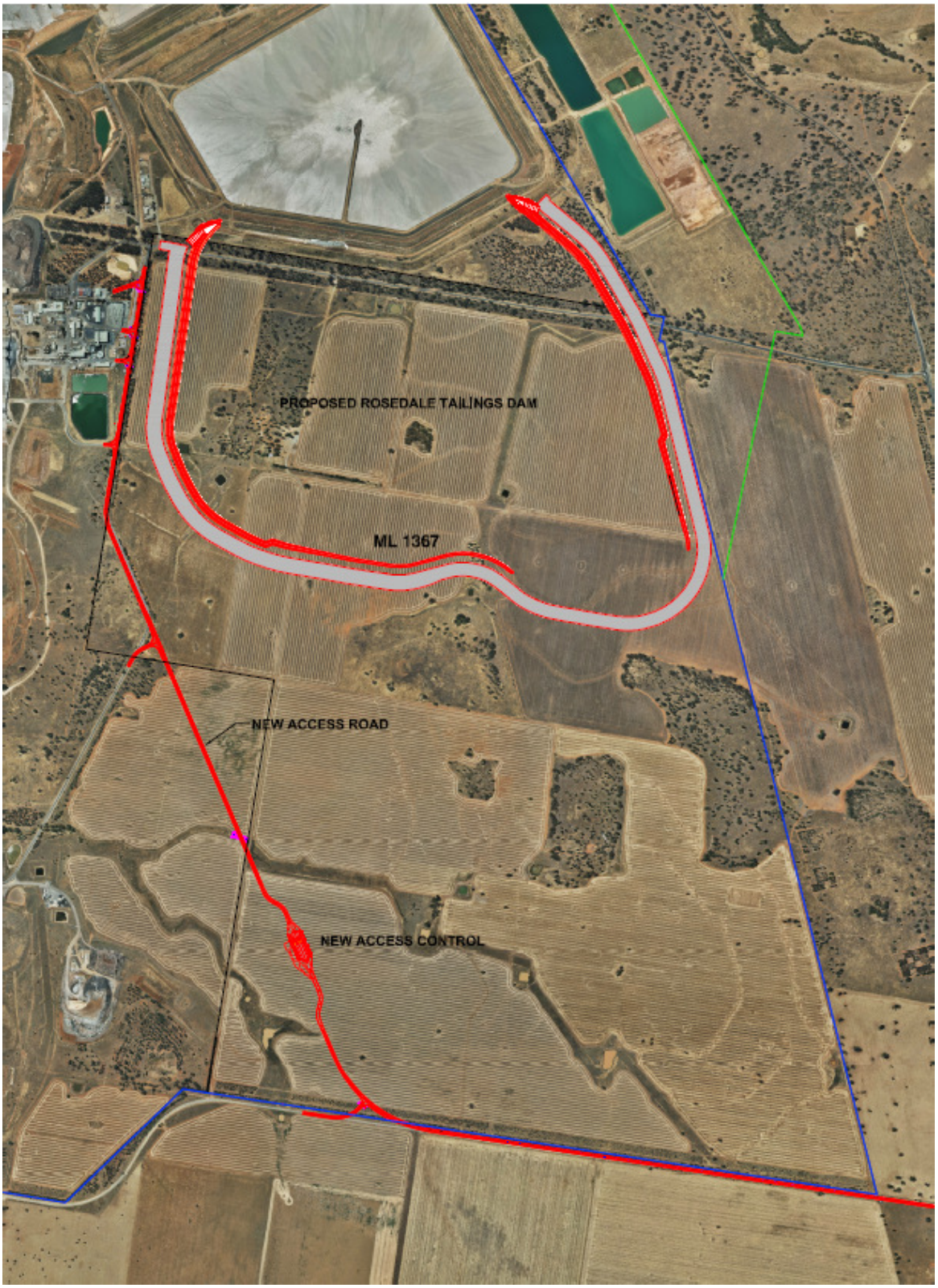


Figure 12 Proposed Rosedale TSF and New Site Access road

2.6 Employment levels

Full time permanent employees increased to 324 in the current reporting period from 310 in the previous reporting period (Figure 13). This increase reflects the business achieving its optimum employment level to ensure maximum operational efficiency. Northparkes continues to employ a large number of contractors to supplement the permanent workforce.

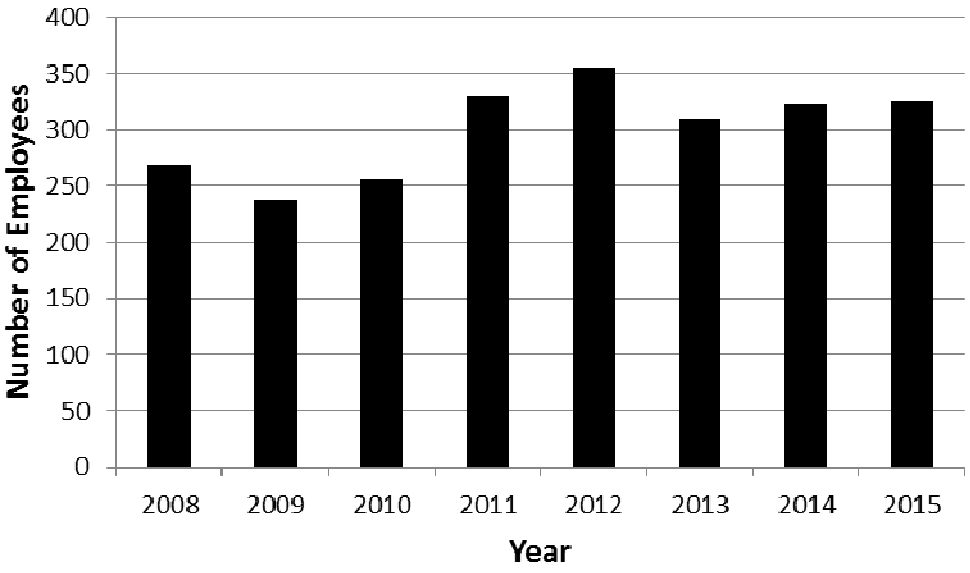


Figure 13 Employment levels at Northparkes

3. ENVIRONMENT AND FARM TEAMS

Northparkes has an HSE Policy committed to pollution prevention and continual improvement of environmental management activities. To support the intent of this Policy, environmental management is undertaken by the onsite Environmental team, which forms part of the Northparkes People, Safety and Environment (PSE) department.

The HSEF policy (Appendix 2) is a part of the developed and implemented Health, Safety, Environment and Quality Management System (HSEQ MS) based on the CMOC HSEQ MS Standard for its global operations. This is certified to ISO14001 and audited on an annual basis.

Team members of the Environment team include the following roles:

- Manager – People, Safety and Environment
- Superintendent – Environment & Farm;
- Senior Environment Advisor;
- Environment & Health Advisor;
- Environment Advisor;
- Environment Trainee; and
- Farm Specialist

3.1 Environmental management system

Northparkes developed, implemented and maintains an ISO 14001 certified HSEQ MS. The HSEQ MS encourages a rigorous and consistent approach to managing and improving its environmental performance across all of its mining and related activities.

The HSEQ MS outlines minimum standards to encourage continual improvement in HSEQ performance. The operational management component of the management system is underpinned by Northparkes' safety, health and environmental performance standards. A periodic Certification Audit against the ISO 14001 standard was conducted in the reporting period. The purpose of the audit is to assess Northparkes' alignment with the ISO14001 Certification. The audit identified four minor non-conformances, two observations and one commendation.

3.2 Reportable environmental incidents

During the reporting period, Northparkes had sixteen reportable environmental incidents. Table 4 provides information on these incidents.

Formal incident notifications summarising the incident details, likely cause/s, actions taken to date and additional proposed measures were submitted to the EPA, the Department of Industry, Resources & Energy and other relevant government agencies in accordance with Northparkes reporting procedures.

Table 4 Environmental Incidents in 2015

Date	Details
January 2015	Total deposited dust value recorded at monitoring location TDSW for the month of January exceeded the air quality criteria of 4 g/m2/month set in the project approval 11_0060. It recorded the value of 5.3 g/m2/month. An investigation was undertaken to determine the likely cause of the exceedance. The investigation concluded that the primary result for an exceedance was the presence of vegetable matter as shown by the organic component of the sample and the south easterly winds coming from east of the mine.
January 2015	Total deposited dust value recorded at monitoring location TDS5 for the month of January exceeded the air quality criteria of 4 g/m2/month set in the project approval 11_0060. It recorded the value of 4.1 g/m2/month. An investigation was undertaken to determine the likely cause of the exceedance. The investigation concluded that this result was most likely due to farming activities being undertaken in the paddock where the monitoring gauge is located: - Directional dust locations indicated that the majority of dust deposited was from the east and west; Northparkes is located to the north - Field notes referenced farming activities in the area - Depositional dust gauges closer to the mine lease boundary were under the internal trigger values.
February 2015	Total deposited dust value recorded at monitoring location TDN5 for the month of February exceeded the air quality criteria of 4 g/m2/month set in the project approval 11_0060. It recorded the value of 4.6 g/m2/month. An investigation was undertaken to determine the likely cause of the exceedance. The investigation concluded that the primary result for an exceedance was the presence of vegetable matter as shown by the organic component of the sample and the south easterly winds coming from east of the mine.
May 2015	Total deposited dust value recorded at monitoring location TDN5 for the month of May exceeded the air quality criteria of 4 g/m2/month set in the project approval 11_0060. It recorded the value of 4.5 g/m2/month. An investigation was undertaken to determine the likely cause of the exceedance. The investigation concluded that in the month of May, there was a dust storm which passed over the mine. The southerly winds, which led to dust lift-off from tailings storage facilities. - Directional dust locations indicated that the majority of dust deposited was from the south and west; which is towards the mine from the dust location. - Depositional dust gauges closer to the mine lease boundary (TDNE and ND19) were under the external trigger values. It was concluded that the likely cause of the exceedance was unknown
June 2015	Total deposited dust value recorded at monitoring location TDN5 for the month of June exceeded the air quality criteria of 4 g/m2/month set in the project approval 11_0060. It recorded the value of 7.1 g/m2/month. An investigation was undertaken to determine the likely cause of the exceedance. The investigation concluded that this result was most likely due to organic matter and activity around the gauge. Reasoning for this is based on the following points from the investigation. - The owner of Milpose was contacted and mentioned sheep-work in the adjacent paddock nearby the depositional gauge. - Field notes indicated the sample contained bugs which would contribute to the ash content. - Nearby dust monitoring location of (TDSW) did not exceed the internal trigger value and there was no associated PM10 exceedance for the month.

August 2015	Total deposited dust value recorded at monitoring location TDN5 for the month of August exceeded the air quality criteria of 4 g/m2/month set in the project approval 11_0060. It recorded the value of 4.1 g/m2/month. An investigation was undertaken to determine the likely cause of the exceedance. The investigation concluded that the August month, experienced some southerly winds, which led to dust lift-off from tailings storage facilities. - Directional dust locations indicated that the majority of dust deposited was from the south and west; which is towards the mine from the dust location - The landowner was contacted and confirmed that were farming activities undertaken on the property. - Depositional dust gauges closer to the mine lease boundary (TDNE and ND19) were under the external trigger values. It was concluded that the likely cause of the exceedance was unknown. Northparkes will closely monitor TDN5 location for the month of September.
August 2015	Total deposited dust value recorded at monitoring location TDS5 for the month of August exceeded the air quality criteria of 4 g/m2/month set in the project approval 11_0060. It recorded the value of 10 g/m2/month. An investigation was undertaken to determine the likely cause of the exceedance. The investigation concluded that the August month, experienced some southerly winds, which led to dust lift-off from tailings storage facilities. - Directional dust locations indicated that the majority of dust deposited was from the south and west; Northparkes mine's is to the north - The landowner was contacted and confirmed that were farming activities undertaken on the property. - Depositional dust gauges closer to the mine lease boundary (TDNE and ND19) were under the external trigger values. It was concluded that the likely cause of the exceedance is unknown.
October 2015	Total deposited dust value recorded at monitoring location TDS5 for the month of October exceeded the air quality criteria of 4 g/m2/month set in the project approval 11_0060. It recorded the value of 10.7 g/m2/month. An investigation was undertaken to determine the likely cause of the exceedance. The investigation concluded, in the October month, experienced some southerly winds, which led to dust lift-off from tailings storage facilities. There were 28 days without rain and the surrounding environment was dry. - Directional dust locations indicated that the majority of dust deposited was from the south and west; Northparkes is located is to the north - The landowner was contacted and confirmed that were minimal farming activities undertaken on the property. - Depositional dust gauges closer to the mine lease TDSW and ND22 were under the external trigger values. It was concluded the likely cause of the exceedance was not from the mine as the surrounding environment was dry and there was some localised traffic on the unsealed road near the dust gauge.
November 2015	Total deposited dust value recorded at monitoring location TDS5 for the month of November exceeded the air quality criteria of 4 g/m2/month set in the project approval 11_0060. It recorded the value of 10 g/m2/month. An investigation was undertaken to determine the likely cause of the exceedance. The investigation concluded that this result was most likely due to organic matter and activity around the gauge. Reasoning for this is based on the following points from the investigation. - The owner of Milpose was contacted and mentioned there was harvesting works in the vicinity go the gauge. Windrose indicated that 78 percent of the winds were from South and East direction away from the mine which is situated to the North.

	- Field notes indicated the sample contained bugs which would contribute to the ash content. - Nearby dust monitoring location of (TDSW) did not exceed the internal trigger value and there was no associated PM10 exceedance for the month.
31 March 2015	PM_{10} 24 hour average result (86.4 ug/m^3) for "Hubberstone" monitoring location exceeded the 24 hour performance criteria (50 ug/m^3) set out in Project Approval 11_0060. The result did not cause an exceedance of the annual average limit. An investigation was undertaken immediately to determine the likely cause of the exceedance. The investigation concluded that the prevailing wind direction was primarily from the East and South-East. Field notes indicate the presence of sheep activity in the nearby paddock. Discussion with the land holder revealed that farming works had been undertaken around the monitoring location. It is deemed that the PM10 24 Hr exceedance at Hubberstone location was not attributed to Northparkes mining operations but from localised farming activities by the land-holder.
13 May 2015	EPA informed Northparkes that they received a dust complaint from a Northparkes neighbours. The EPA conducted a site inspection on the same day and discussed Northparkes dust management strategies. Northparkes submitted a report to EPA on 22 May 2015. The report details Northparkes' short and long-term strategies for managing dust from the tailings storage facilities.
17 September 2015	Northparkes self-reported a dust incident from the TSF to the EPA via the pollution hotline. The dust incident was due to high wind speeds, carrying the dust offsite.
24 September 2015	EPA informed Northparkes that they received a dust complaint from one of Northparkes' neighbouring farmers regrading tailings dust blowing offsite. Northparkes implemented all short-term strategies to minimise the dust lift-off from the TSF. An incident report was submitted to the EPA on 30 September 2015.
5 June 2015	Northparkes reported a tailings spill incident to EPA on 5 June 2015 via the EPA Pollution Hotline. The tails line on the eastern line of the contractor yards spilt which resulted in 4000m3 of tailings spill, causing the spillage to flow across the access road. The Eastern line failure was caused by a broken flange joint on the pipe connecting spool, which resulted in slurry being deposited outside the tailings pipe.
22 June 2015	Northparkes reported a concentrate spill at Goonumbla rail sidings. Northparkes transports copper concentrate via trucks to Goonumbla train loading facility, where the concentrate containers is loaded on to trains to Port Kembla. While unloading the copper concentrate containers from the road train the operator was attempting to double stack loaded containers. During the process the container slid forward on the forks toppling onto the ground, which resulted in an eight tonne spill of copper concentrate on the ground. All copper concentrate was spilled onto hard stand area within the bund. No environmental harm resulted from the incident.
21 May 2015	Northparkes reported an unauthorised clearing of vegetation outside the approved area to the EPA and Department of Planning and Environment. The contractor disturbed area outside the approved Site Disturbance Permit (Northparkes internal requirement). The contractor graded the area outside the SDP to stockpile trees and vegetation removed for the construction of new Tailings Storage Facility (Rosedale Project). An investigation was undertaken to identify the cause. Actions taken to date include tree planting with remnant vegetation species in the disturbed area and signage installed.

3.3 Meteorology

Reporting period summary

- Annual rainfall was 92 percent of the long-term annual average
- Six major rainfall events triggering flow

3.3.1 Monitoring

Northparkes operates a meteorological monitoring station located within ML 1367 that complies with AS 2923. The weather station records 10-minute and 24-hour average wind speed, wind direction, air temperature, relative humidity, solar radiation and rainfall.

3.3.2 Management

A meteorological monitoring station is maintained to provide real time and periodic meteorological data for operational purposes. The interpretation of meteorological data assists in daily operational planning and management and provides a historical record.

Employees access weather data via the Northparkes intranet; this data is used in internal and external environmental reporting.

3.3.3 Results

A total rainfall of 421.8 mm was recorded at the weather station during the reporting period. This represents a 90 mm decrease from the previous reporting period. The rainfall received during the reporting period was below the long-term average for the region. Table 5 outlines rainfall figures in comparison with the long-term average.

Temperature and evaporation for the reporting period are shown in Table 5. Daily temperature, wind and rainfall data for the reporting period is provided in Appendix 3. Evaporation followed expected seasonal trends observed in previous climatic conditions for the region. The monthly maximum temperatures were significantly warmer, recorded at a mean of +1.26°C above the average. These figures are consistent with the national average which experienced the third warmest year on record.

North-east and south-east winds were the dominant winds throughout the reporting period. This is similar to previous reporting periods and consistent with long-term trends. Annual and quarterly wind roses have been produced to identify the predominant wind directions observed throughout the reporting period.

Table 5 Rainfall summary for 2015

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Monthly Total (mm)	32.6	30.6	0.2	58	10.2	40.4	47.6	37.8	6	67.4	62.4	28.6
Long Term Average (mm)	56.1	52.1	46.4	43.4	49.2	42.6	46.5	48.7	41.2	51.3	49.1	52.4
YTD Actual (mm)	32.6	63.2	63.4	121.4	131.6	172	219.6	257.4	263.4	330.8	393.2	421.8
Wet days	9	3	1	8	4	12	14	10	4	4	9	7
Maximum Temp (Deg C)	38.4	40.2	36.6	32.5	27.5	22.3	18.1	26.6	29.2	37.6	41.5	41.8
Minimum Temp (Deg C)	11.6	12.4	6.7	3.6	-0.5	-3.8	-3.6	-2.8	-0.7	3.8	7.8	8.5

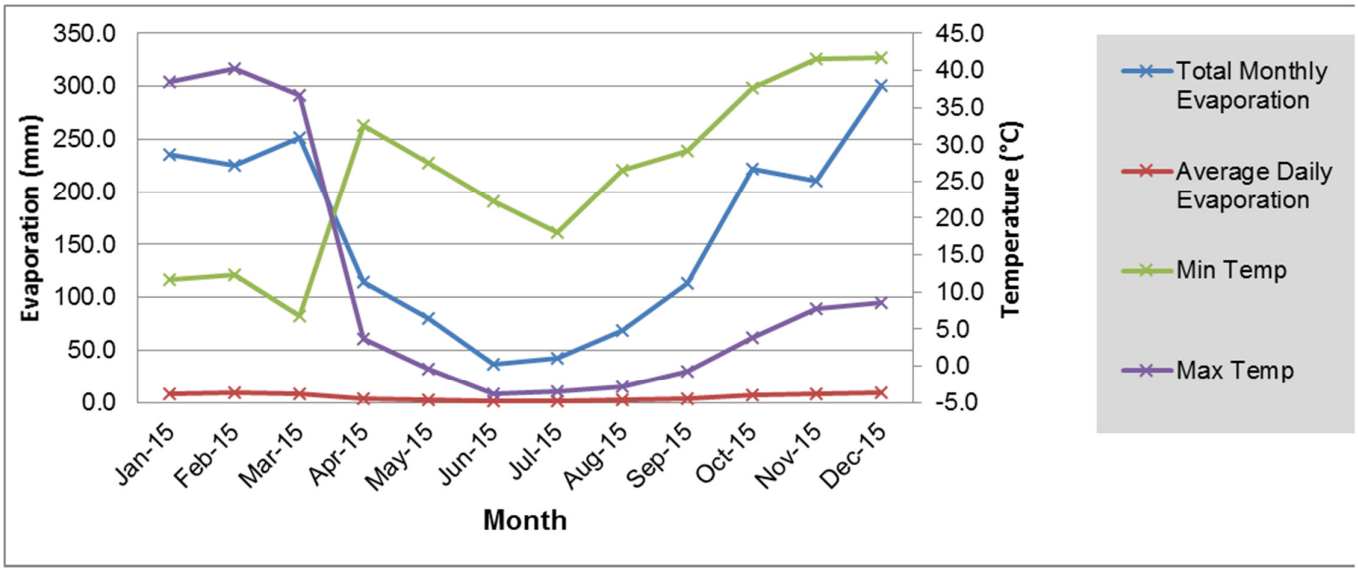
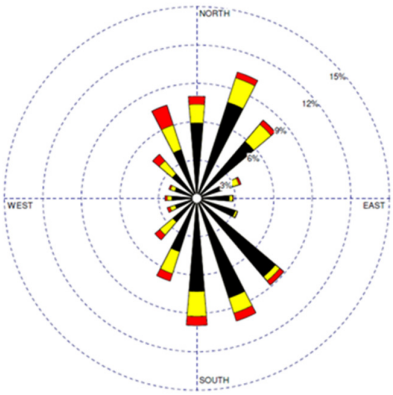
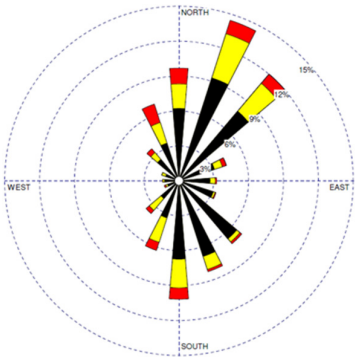


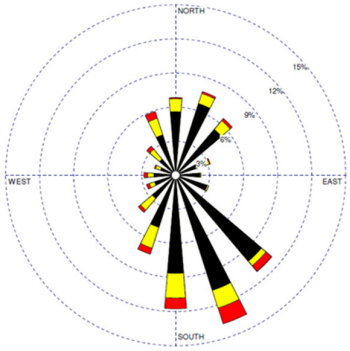
Figure 14 Temperature and Evaporation Summary for 2015



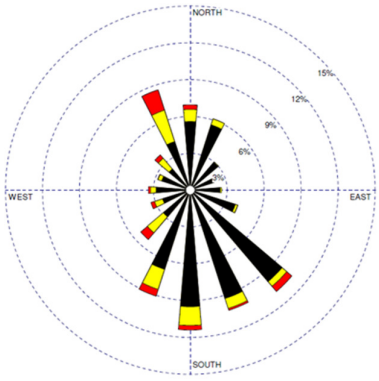
2015 Summary



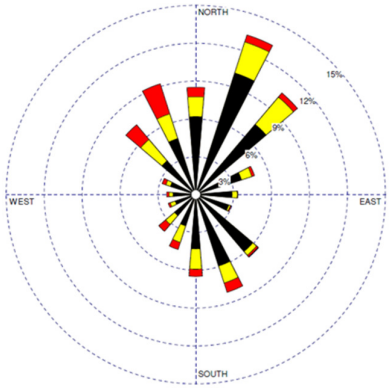
Q1 2015 Summary



Q2 2015 Summary



Q3 2015 Summary



Q4 2015 Summary

Figure 15 Windrose for 2015

3.3.4 Actions Proposed for 2016

- Continued calibration of the weather station

3.4 Air Quality

Reporting period summary

- All required monitoring was conducted during the reporting period
- Straw bales on the surface of TSF1 continued to operate as an effective breakdown of wind activity and reduce dust exceedances / complaints
- Chisel ploughing was undertaken on tailings surface to reduce the wind velocity
- Barley growth trails commenced on TSF2
- Two community complaints were received, both relating to dust

3.4.1 Monitoring

Northparkes has implemented an air quality monitoring program to periodically sample at key locations on and adjacent to the Mine Lease. The program is designed to assess the effectiveness of dust control measures and ensure compliance with PA11_0060 and EPL 4784 conditions as well as internal standards and procedures.

The monitoring program consists of PM_{10} (real time continuous monitoring using beta-attenuation monitors (BAMs)) and depositional dust gauges. These 11 monitoring points are strategically located around the mine lease and neighbouring properties (Figure 16).

Fine dust particles measured as PM_{10} are monitored using Beta Attenuation Monitors (BAMs). Each station is fitted with a size selective inlet that operates 24 hours per day in accordance with AS 3580.9.6. These samplers monitor dust particles that, similar to dust deposition, can also be sourced from a range of mining and non-mining activities. PM_{10} monitoring is undertaken at the local residences of 'Hubberstone', 'Hillview' and 'Milpose'.

Total suspended particulate matter (TSP), is measured using a high volume sampler (Hi-Vol), which samples for 24 hours every six days. Monitoring is conducted in accordance with AS/NZS 3580.9.3:2003 – *Methods for sampling and analysis of ambient air Method 9.3: Determination of suspended particulate matter—Total suspended particulate matter (TSP) — High volume sampler gravimetric* method. TSP monitoring is undertaken at 'Hubberstone', 'Hillview' and 'Milpose'.

Depositional dust gauges record the total of deposited dust for a month-long period. Depositional dust gauges are a useful measure of broad scale changes to the local air quality but may be influenced by a number of sources including mining, agriculture, ambient dust, fires and vehicle emissions. Sample collection may also be affected by non-mining organic contamination (e.g. bird droppings, sticks and insects). For this reason, depositional dust gauges are a less accurate sampling method than TSP and PM10 monitoring methods.

Depositional dust samples are analysed for insoluble solids, ash residue and combustible matter so that the impact of sample contamination can be assessed.

Figure 16 Northparkes Air Quality Monitoring Locations

3.4.2 Management

Northparkes' Air Quality Management Plan provides a framework to assess, monitor and manage potential dust impact as a result of its activities. Operational and design controls to manage air quality include:

- Conduct environmental training and awareness for employees and contractors
- Seal high traffic roads, where possible
- Transport copper concentrate product in sealed containers
- Use of road sweeper on sealed trafficable areas
- Use of water carts and water sprays on unsealed roads
- Minimise clearing activities and undertaking progressive rehabilitation
- Use conveyor systems as opposed to haul trucks in the material handling system
- Use control mechanisms on crushing and conveying infrastructure, including complete or partial enclosure, dust extraction filters and mist sprays
- Operate tailings storage facilities to minimise dust and cap as early as practicable
- Implement dust controls on surface reverse circulation drill rigs
- Conduct monthly air quality monitoring
- Conduct weekly and real time dust monitoring

3.4.3 Results

All dust samples are collected by trained staff and analysed by NATA certified laboratories. This work is carried out in accordance with relevant statutory and industry code standards. Monitoring equipment is maintained in accordance with manufacturer's specifications.

All dust results are made publically available on the Northparkes website through the Quarterly Reports, as per PA11_0060.

PM_{10}

PM_{10} monitoring results for 'Hubberstone', 'Milpose' and 'Hillview' monitoring locations for the reporting period are displayed in Figure 17, Figure 18 and Figure 19 respectively. The criteria for exceedances (as nominated in PA11_0060), for 'Hubberstone', 'Milpose' and 'Hillview', are >30 µg/m^3 for the annual average and >50 µg/m^3 for a 24-hour monitoring period.

Fine dust particles, up to 10 microns in diameter, are measured as PM_{10}. This particulate matter is monitored using continuous, carbon-14, beta-attenuation monitors (BAMs), which are fitted with a size selective inlet. Each BAM station operates continuously, in accordance with *Australian Standard 3580.9.11:2008, PM_{10} continuous direct mass method using Beta Attenuation Measurement*. This method is set to measure time-integrated mean particle concentrations for 10 minute periods. These measurements are subsequently averaged over a 24-hour period, to provide a 24h-average PM_{10} concentration. PM_{10} dust particles can be sourced from a range of mining and non-mining activities and are typically formed by mechanical disruption with a lifetime that can range from minutes to hours and travel times varying from <1km to up to 10km.

Monitoring results for the 'Hubberstone' location was under the air quality criteria required by the Project Approval. The PM10 monitor at Hubberstone did not operate from 26 August to 6 October due to faulty equipment. The unit was replaced with a new PM10 unit. The EPA was notified of these incident.

Monitoring results for the 'Milipose' location shows no exceedance for the reporting period. The PM10 monitor at Milpose did not operate from 16 August to 17 September due to an electrical fault in the equipment. The unit was calibrated and the EPA notified of the incident.

Similarly, the monitoring results for the 'Hillview' location shows no exceedance for the reporting period. The PM10 monitor at Milpose did not operate from 17 August to 17 September due to an electrical fault in the equipment. The unit was calibrated and the EPA was notified of the incident.

In Quarter 4 of the monitoring period The PM_{10} monitor did not operate at Hubberstone for six days and for three days at Milpose during the reporting period. Alternatively, periods where the PM_{10} monitor did not run at Hubberstone were due to power issues that occurred at this residence.

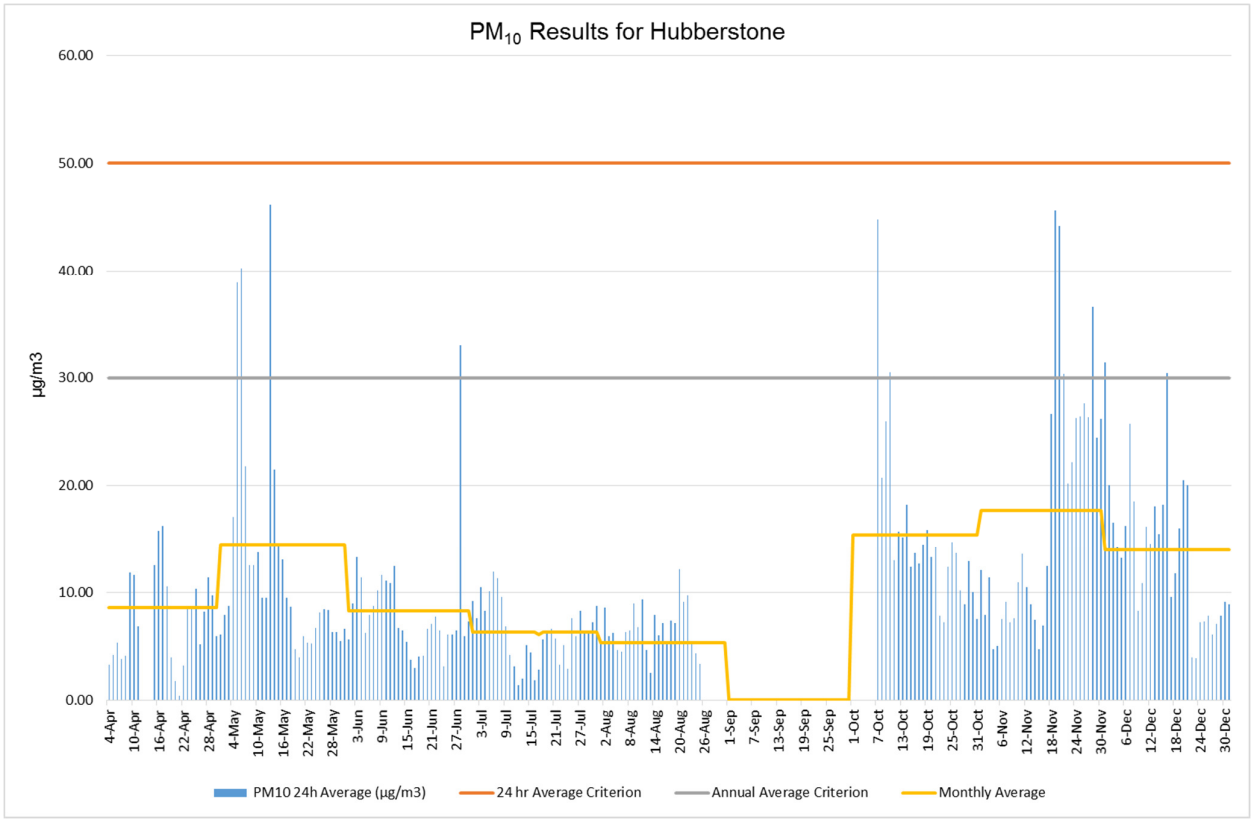


Figure 17 PM10 monitoring results- Hubberstone

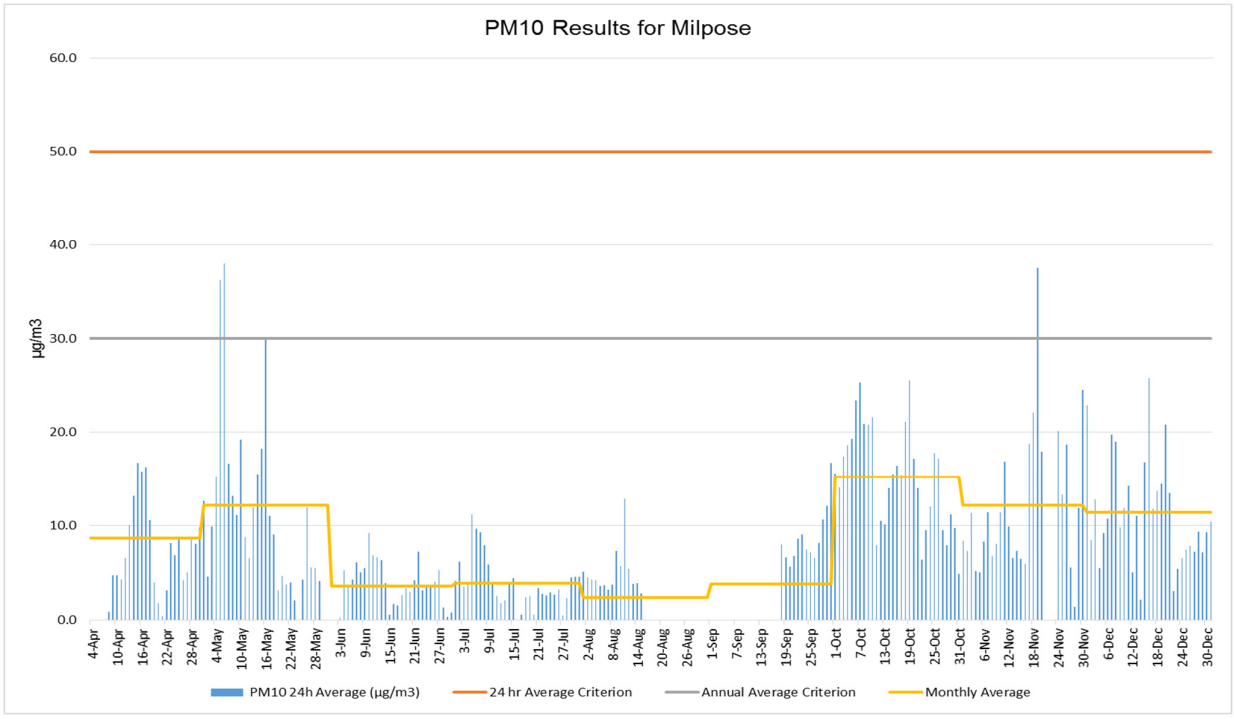


Figure 18 PM10 monitoring results – Milpose

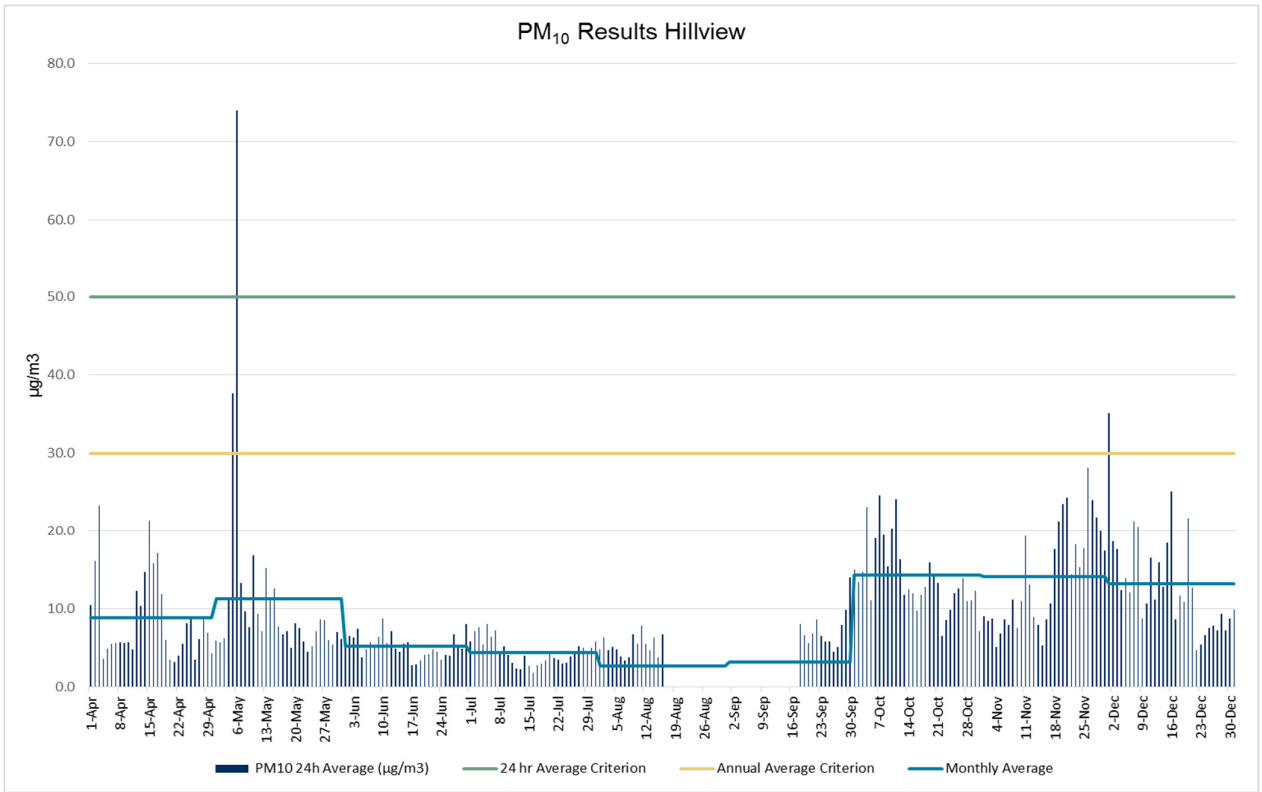


Figure 19 PM10 monitoring results - Hillview

Total Suspended Solids (TSP)

Total suspended particulate matter (TSP), is measured using a high volume sampler (Hi-Vol), which samples for 24 hours every six days. Monitoring is conducted in accordance with AS/NZS 3580.9.3:2003 – *Methods for sampling and analysis of ambient air Method 9.3: Determination of suspended particulate matter—Total suspended particulate matter (TSP) — high volume sampler gravimetric* method. TSP generally includes particles with an equivalent aerodynamic diameter (EAD) of less than 50 µm and can include particles generated from burning of vegetation, industrial/mining processes, combustion and natural causes

TSP monitoring commenced on 7March 2015 (Q1), to align with the commencement of the Rosedale Tailings Project. At Hubberstone, two exceedances were recorded over the reporting period, one at 160 ug/m3 on 6 May 2015 and 100 ug/m3 on 20 November 2015. Investigations were undertaken in both instances and revealed that the exceedance was due to farming and harvesting activities and was not attributable to Northparkes mining operations. All recorded values at Milpose and Hillview were under the required criteria for 2015 monitoring period.

All the exceedances in PA11_0060 nominated criteria were investigated, and in the majority of cases it was found that the result was due to localised activities (e.g. shearing of sheep, farming activities, harvesting and vehicle movement). These results were considered anomalies and were therefore not included in the calculation of the reporting period's annual average.

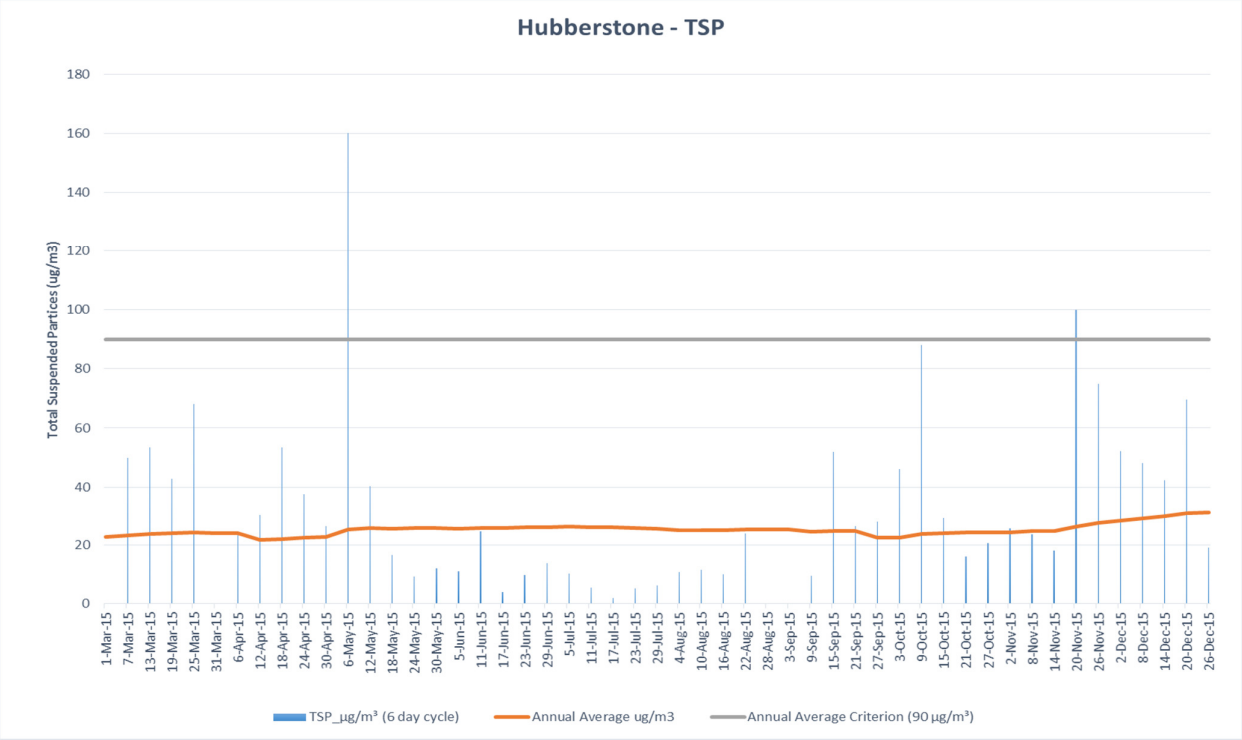


Figure 20 TSP results for Hubberstone

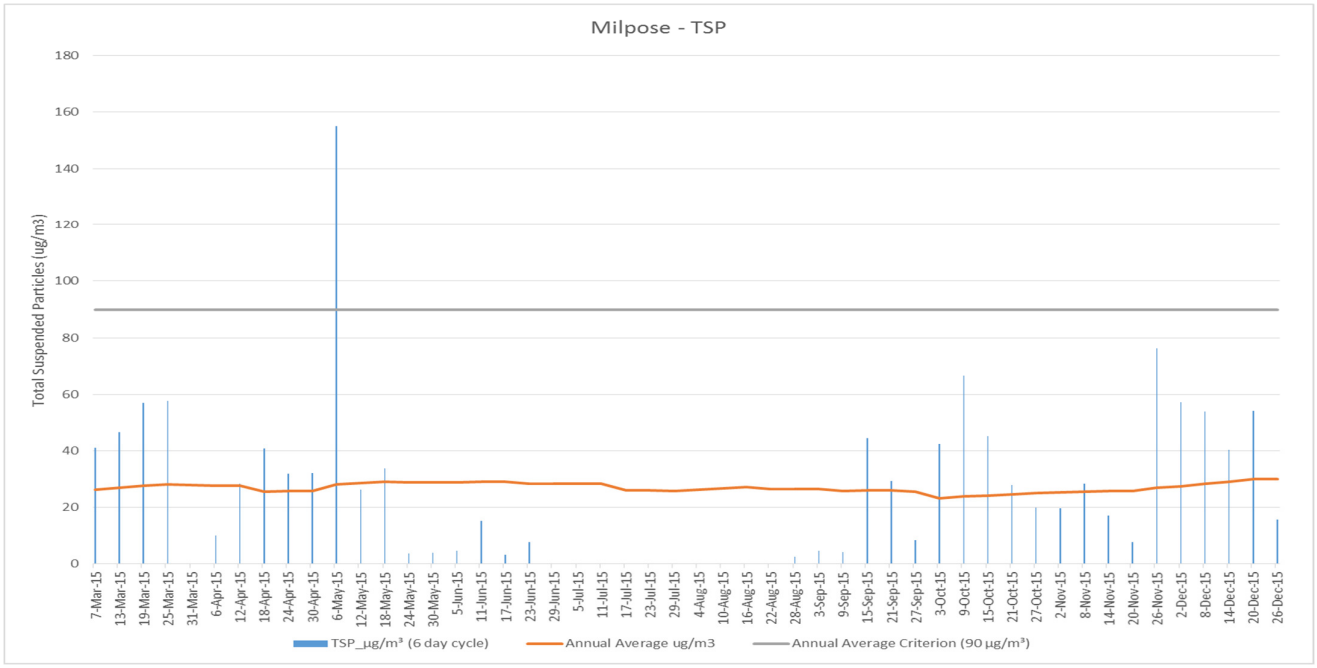


Figure 21 TSP results for Milpose

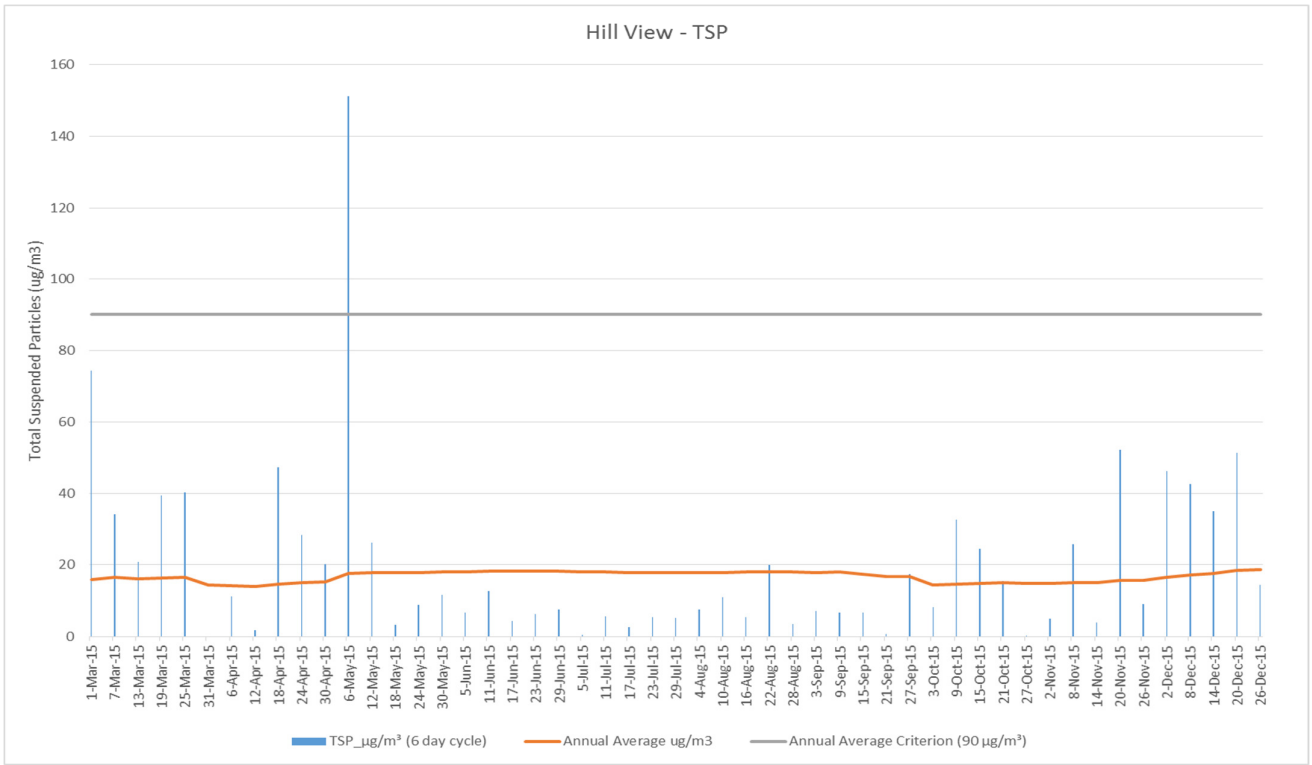


Figure 22 TSP results for Hillview

Note: All TSP exceedances have been investigated and reported to the relevant regulatory agency. Further details can be found in Table 4.

Depositional Dust

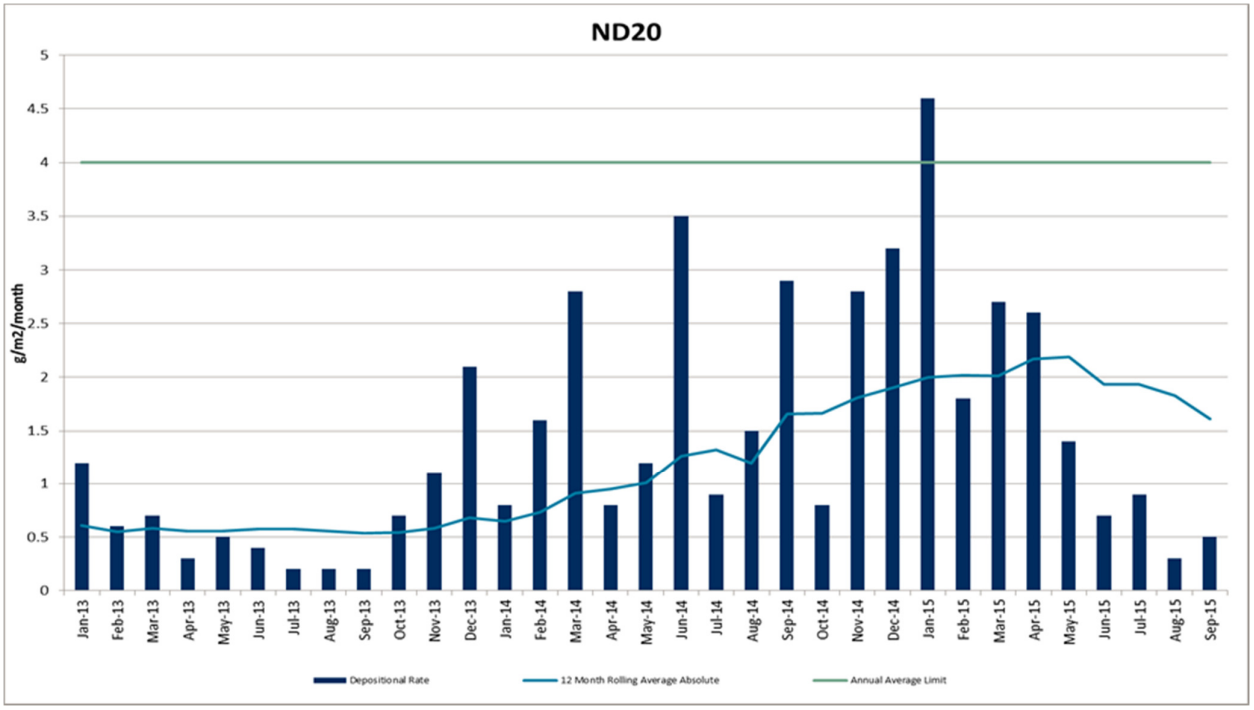
The indicative annual averages (IAAs), calculated from the monthly dust deposition results, are displayed from 2013 to the current reporting period, for each of the monitoring sites.

During the reporting period, the calculated IAA dust deposition level was below the regulatory limit of 4g/m2/month IAA. However, at a number of locations, individual results greater than the internal trigger value were received and investigated, but did not result in any exceedances of the IAA in PA11_0060.

The results at dust monitoring location ND19, ND21, TDE and TDW included zero exceedances and the results were under the required criteria specified in the Project Approval. There was one exceedance at ND20, TDE5, TDNE and TSDW location. ND22 and TDS5 recorded two exceedances over the monitoring period and TDN5 recorded four exceedances over the reporting period. All exceedances were investigated to identify the likely source of dust. A high proportion of anomalous results were due to external contaminants, such as bird droppings, bugs, organic matter, and dust from local farming activities. In cases where values above the trigger value were not a result of Northparkes' activities, these results were deemed an outlier and excluded from the IAA calculation. Table 6 summarises the results of these investigations during the reporting period.

Table 6 Summary of depositional dust investigations

Location	Month	Contamination due to	Excluded from IAA
ND20	January	Organic matter, sheep activity	✓
ND22	January	Organic matter, bird dropping	✓
	June	Farming activities	✓
	November	Organic matter and insects	✓
TDE5	July	Farming activities	✓
TDN5	February	Road works	✓
	April	Farming activities	✓
	May	Stock movement	✓
	August	Harvesting in the neighbouring property	✓
TDNE	December	Farm activity	✓
TDS5	January	Farm activity	✓
	August	Stock movement	✓
	October	Farm activity	✓
TDSW	January	Organic matter	✓


ND20
g/m2/month
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
Jan-13
Feb-13
Mar-13
Apr-13
May-13
Jun-13
Jul-13
Aug-13
Sep-13
Oct-13
Nov-13
Dec-13
Jan-14
Feb-14
Mar-14
Apr-14
May-14
Jun-14
Jul-14
Aug-14
Sep-14
Oct-14
Nov-14
Dec-14
Jan-15
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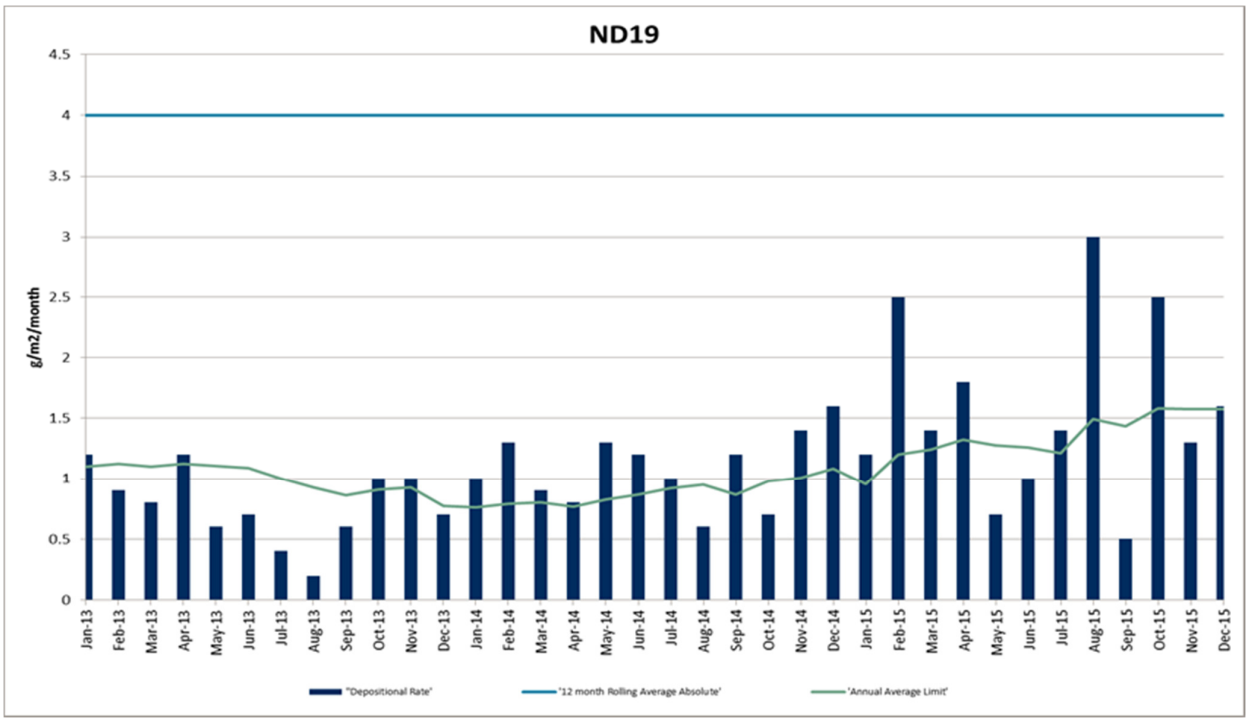
Apr-15
May-15
Jun-15
Jul-15
Aug-15
Sep-15
Depositional Rate
12 Month Rolling Average Absolute
Annual Average Limit


ND19
g/m2/month
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
Jan-13
Feb-13
Mar-13
Apr-13
May-13
Jun-13
Jul-13
Aug-13
Sep-13
Oct-13
Nov-13
Dec-13
Jan-14
Feb-14
Mar-14
Apr-14
May-14
Jun-14
Jul-14
Aug-14
Sep-14
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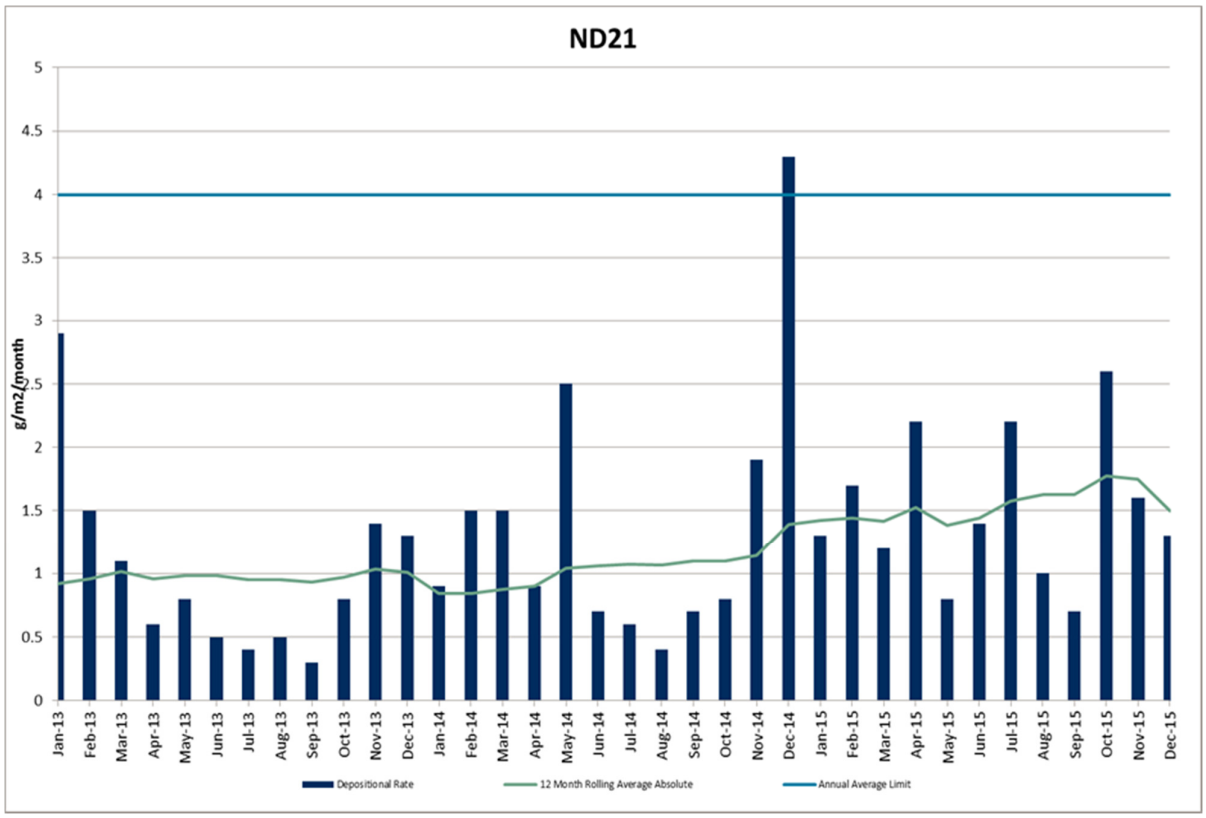
Dec-15
'Depositional Rate'
'12 month Rolling Average Absolute'
'Annual Average Limit'


ND21
g/m2/month
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
Jan-13
Feb-13
Mar-13
Apr-13
May-13
Jun-13
Jul-13
Aug-13
Sep-13
Oct-13
Nov-13
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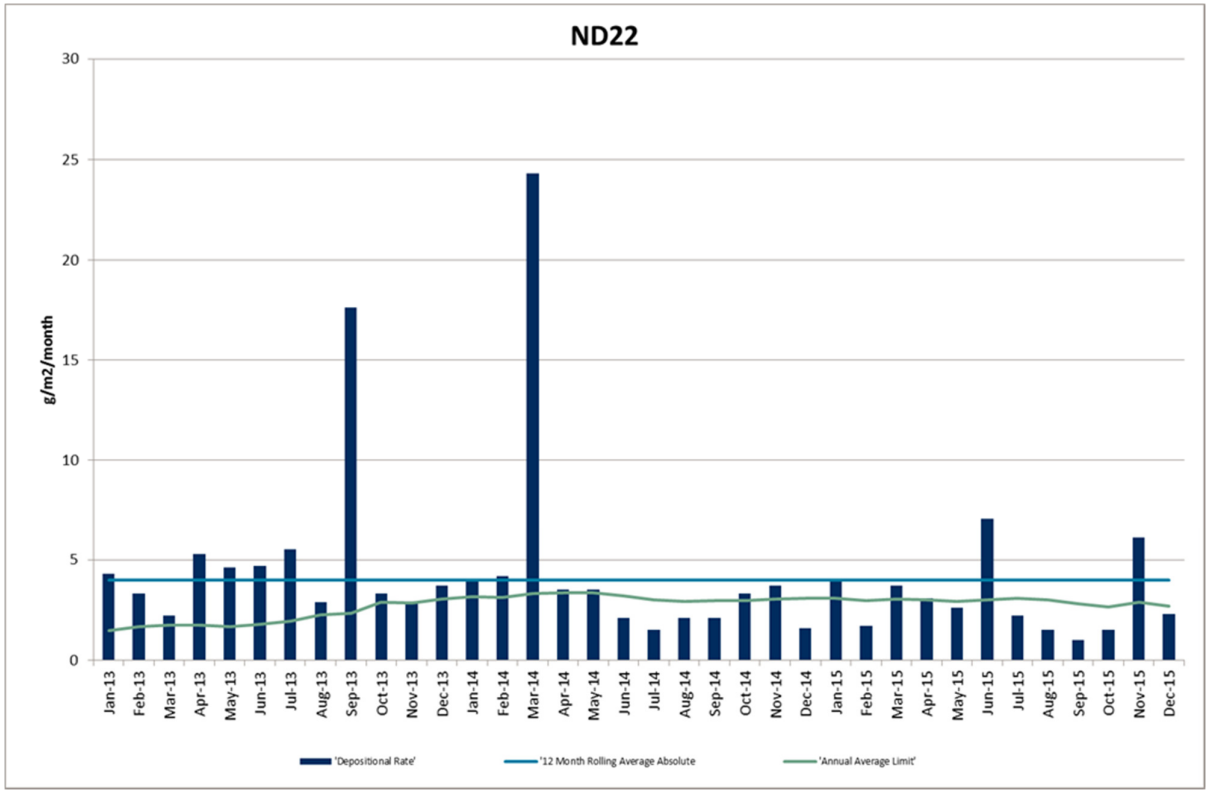
Dec-15
Depositional Rate
12 Month Rolling Average Absolute
Annual Average Limit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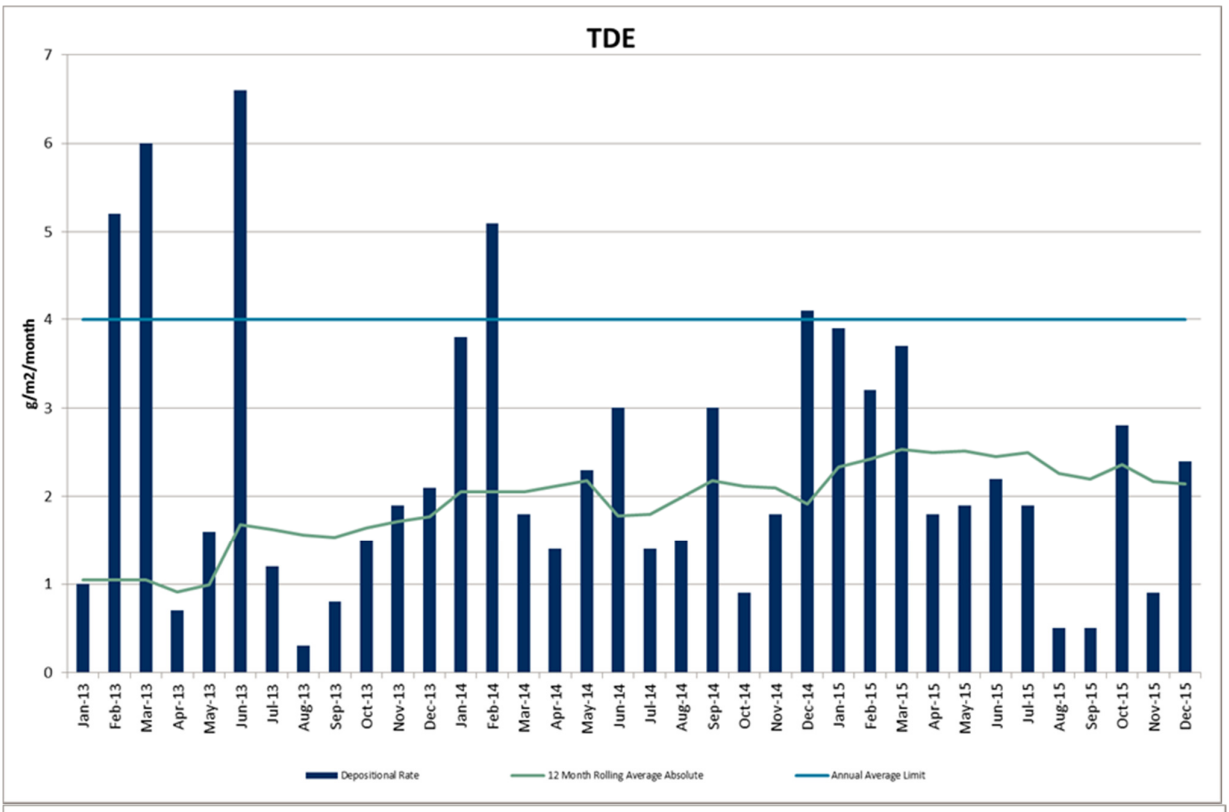
'Annual Average Limit'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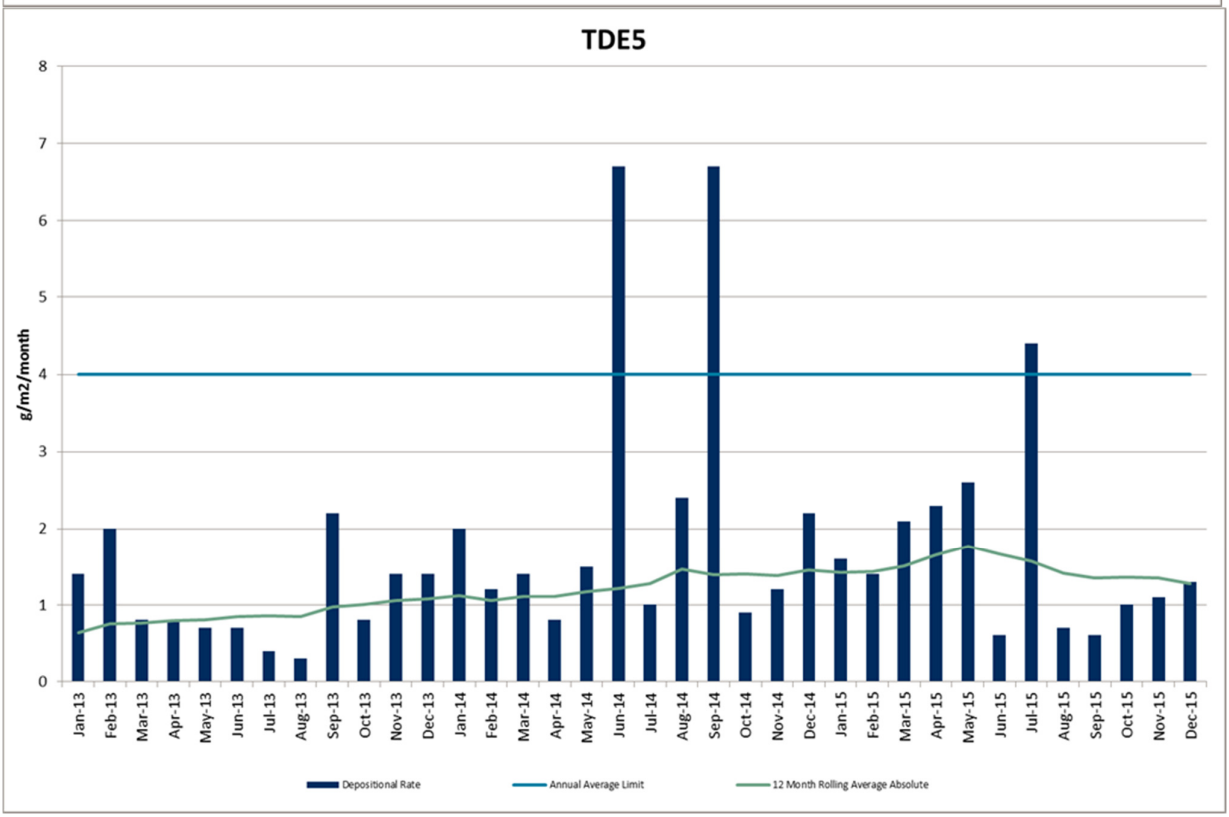
12 Month Rolling Average Absolute
Annual Average Limit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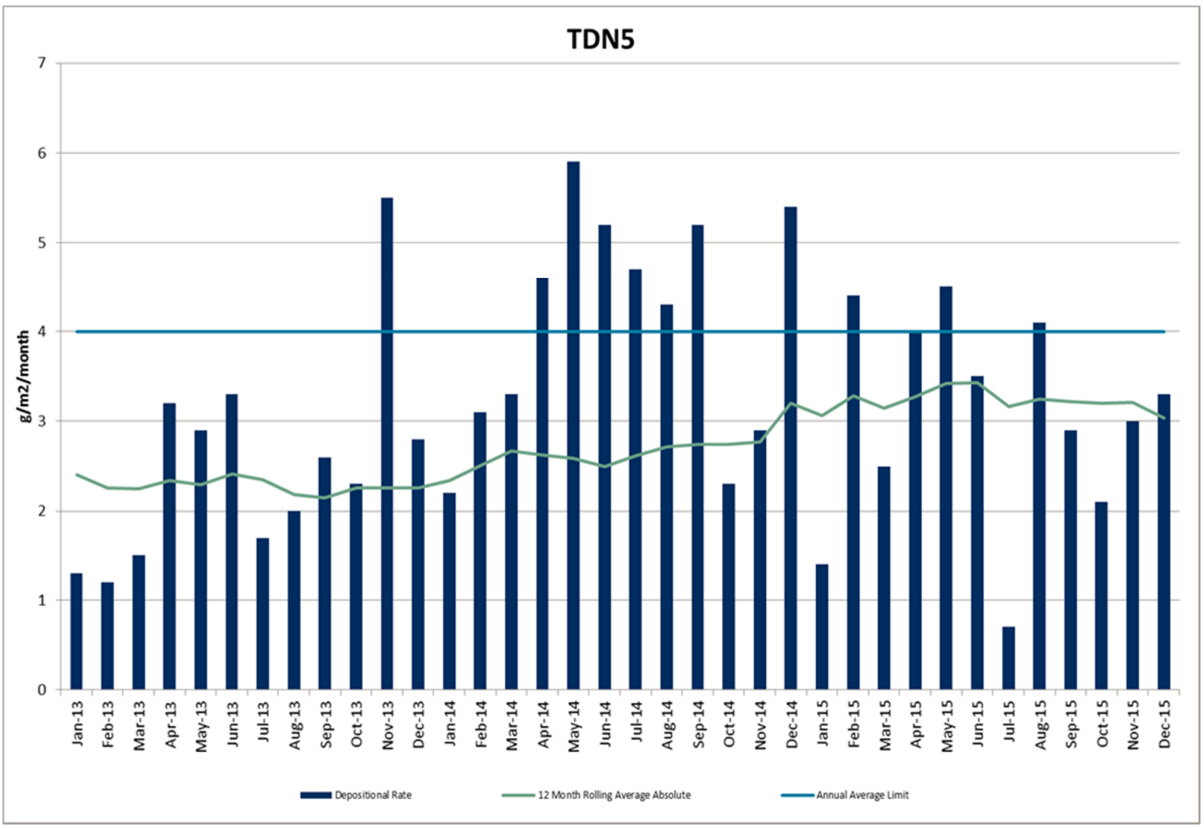
Depositional Rate
Annual Average Limit
12 Month Rolling Average Absolute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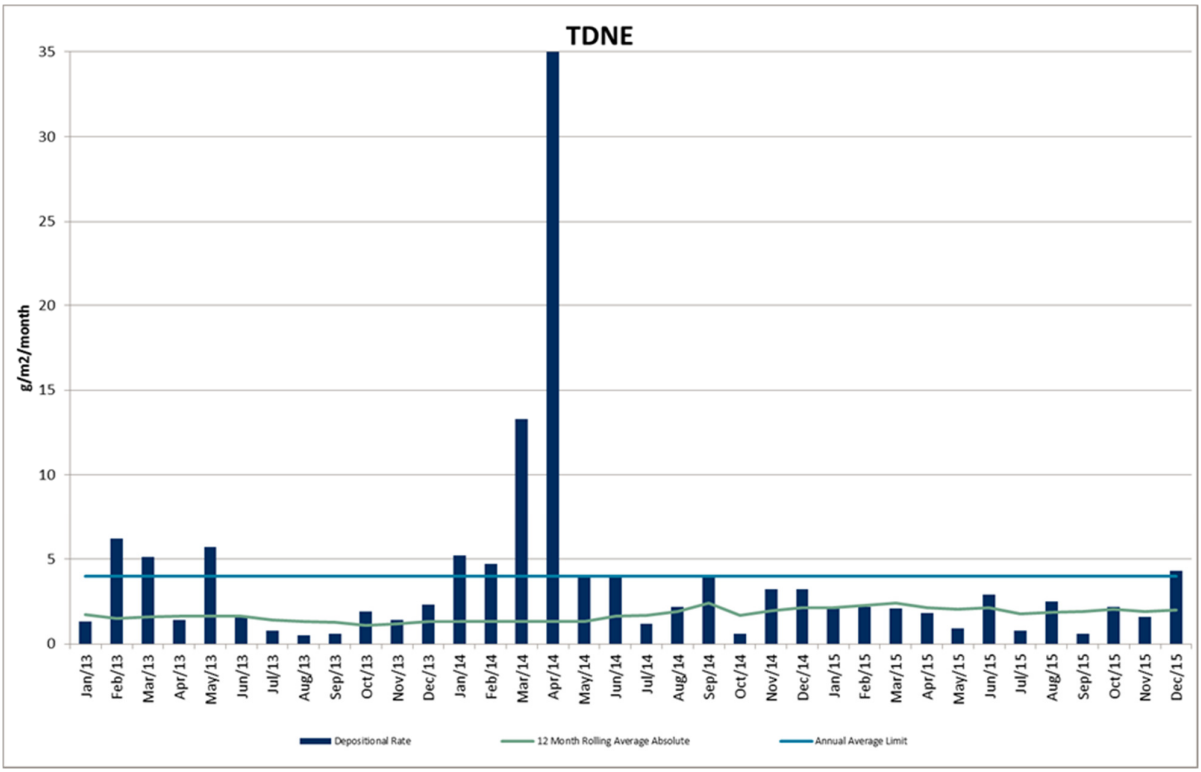
Depositional Rate
12 Month Rolling Average Absolute
Annual Average Limit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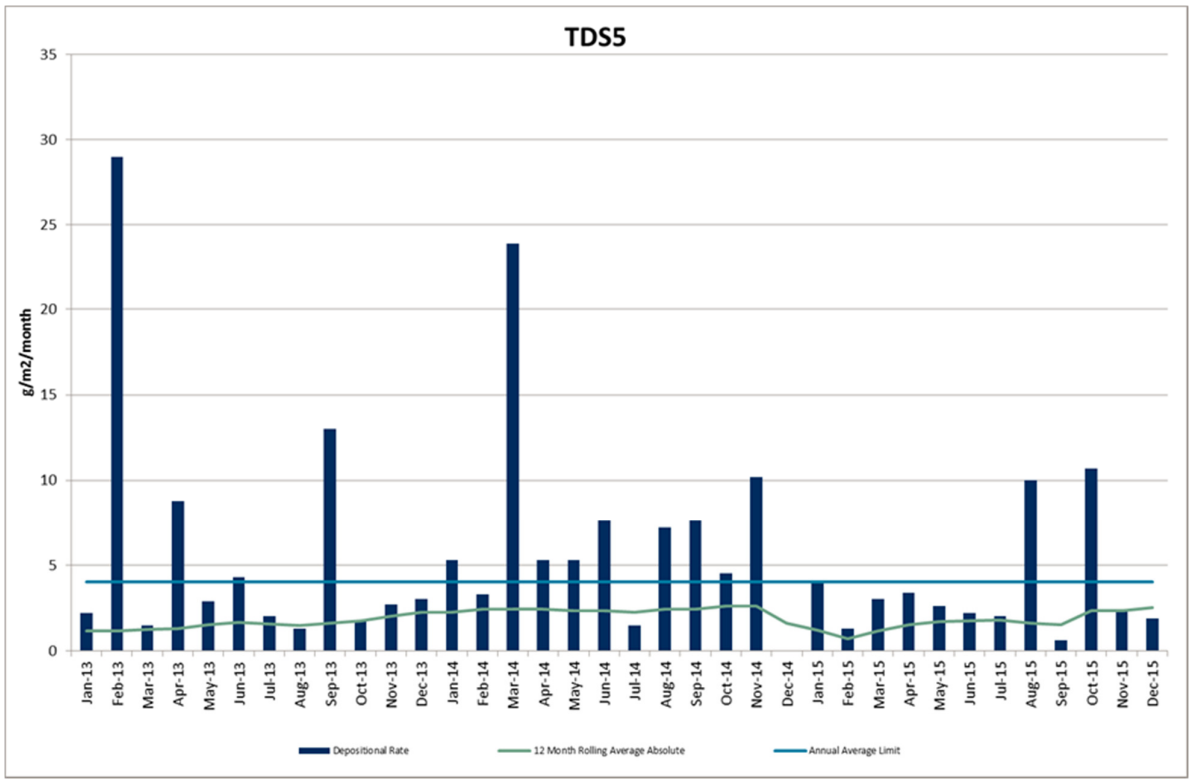
Depositional Rate
12 Month Rolling Average Absolute
Annual Average Limit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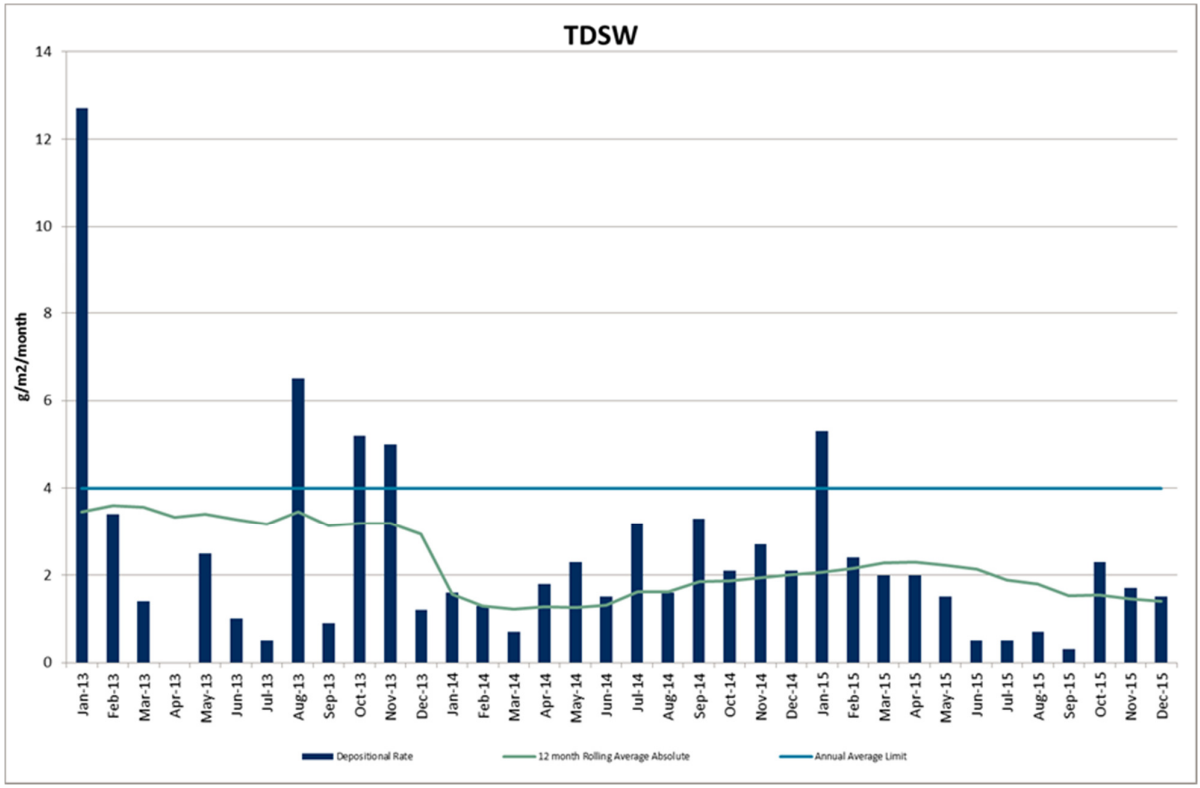
Depositional Rate
12 Month Rolling Average Absolute
Annual Average Limit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g/m2/month
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Depositional Rate
12 month Rolling Average Absolute
Annual Average Limit

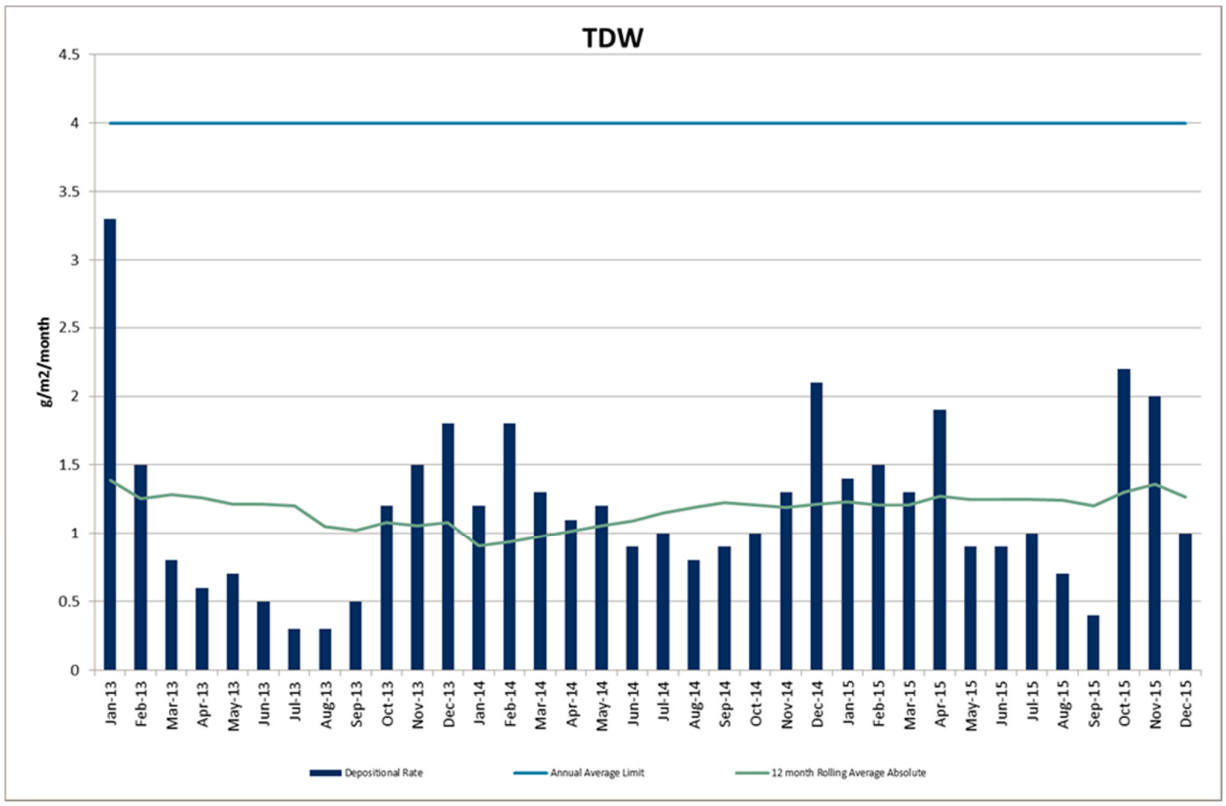


Figure 23 Depositional dust annual averages

Note: All depositional dust exceedances have been investigated and reported to the relevant regulatory agency. Further details can be found in Table 4.

3.4.4 Actions proposed for 2016

- Calibrate all 24-hour real-time PM10 monitors to comply with PA11_0060
- Analyse real time data to identify any non-compliance
- Continue rehabilitation trails of TSF1
- Continue Total Suspended Particles (TSP) monitoring at all four locations as required by the Project Approval (11_0060)

3.5 Noise

Reporting period summary

- Quarterly noise monitoring completed by external noise specialists
- Real time noise monitors have been installed at 'Hubberstone', 'Milpose' and 'Hillview'.
- No exceedances of regulatory noise criteria

Noise associated with the mining activities has the potential to affect the surrounding community. Northparkes implements a number of controls to mitigate noise that may be generated from on-site activities.

3.5.1 Monitoring

Northparkes undertakes a noise monitoring program at three locations on privately owned properties outside the mining leases. The fourth location 'Hillview' has been added into the Northparkes Noise Monitoring Program as required by the Project Approval (11_0060). The program consists of both operator-attended and unattended surveys at the three nearest occupied residences 'Hubberstone', 'Milpose', 'Lone Pine' and 'Hillview' (Figure 24).

Noise measurements are undertaken in accordance with the requirements of new Project Approval (11_0060), AS 1055, and the DECC Industrial Noise Policy, 2000. Northparkes engages external noise specialists to monitor and analyse the results. All acoustic instrumentation is designed to comply with the requirements of AS 1259.2 and carries current NATA or manufacturer calibration certificates.

Received levels from various noise sources are noted during operator-attended monitoring and particular attention is paid to the extent of the Northparkes contribution, if any, to measured noise levels. In addition, the operator quantifies and characterises the overall levels of ambient noise. Noise occurring during the surveys is recorded by the operator with an indication of the noise source, noise type, and the time of occurrence. Effect on the mine noise propagation is established by assessing prevailing weather conditions recorded at the Northparkes weather station, and at the time of the monitoring by the operator. A summary of the weather data is available in Appendix 3.

In addition to the operator-attended monitoring, unattended continuous noise logging is undertaken at the three monitoring locations. This allows Northparkes to determine the overall ambient noise amenity levels of background noise, and any noise generated by mine activity. This is undertaken continuously over the year and the information is assessed. The ambient noise levels obtained from the loggers are not necessarily the contributed noise emissions arising from Northparkes operations alone. The ambient noise level data quantifies the overall noise level at a given location independent of its source or character. The noise logger calculates the statistical noise indices and does not 'record' the actual noise.

Figure 24 Northparkes Noise monitoring locations

3.5.2 Management

Controls to manage noise as a result of Northparkes activities are implemented in all work areas and detailed in the site Noise Management Plan. Such controls include:

- Risk assessment of major works, prior to commencement, to consider noise management
- Training and awareness for all employees and contractors
- Consideration of noise and relevant noise emission standards in the purchase of equipment
- Planned and scheduled maintenance programs of mobile and fixed machinery
- Regular meetings with neighbouring landowners
- Sounds bunds
- Scheduling of work during daylight hours and restricted times
- A quarterly noise monitoring program undertaken by specialist noise consultants

In the event that noise related complaints and/or exceedances of noise level criteria occur, these are reported to the NSW Environment Protection Agency and Department of Planning & Environment and investigated accordingly. A quarterly summary of the noise monitoring results is made available on the Northparkes website.

3.5.3 Results

A total of 144 attended noise surveys were undertaken during the reporting period, of which 1362 (i.e. 92 per cent) were during favourable meteorological conditions stipulated into Project Approval conditions. The surveys undertaken during unfavourable meteorological conditions were excluded from assessment. The reasons for this included the wind speed exceeding 3 m/s and rain.

Unattended noise monitoring was conducted continuously over the year at each monitoring location. This data was used to assess background ambient noise levels and do not have an applicable exceedance criteria.

Monitoring results during the reporting period were in compliance with the limits specified in the new Project Approval (11_0060) and no noise exceedances were recorded with the project approval noise criteria. All attended and attended monitoring data are available in Appendix 4.

During the life of the project the noise monitoring results have generally been in compliance with the limits specified in the new Project Approval (11_0060).

3.5.4 Actions proposed for 2016

- Real time monitoring of noise data from all four locations
- Removal of unattended noise monitoring from noise schedule due to the installation of real-time noise monitors
- Technical review of all real time noise data

3.6 Blasting

The objective of blasting is to ensure the optimal fragmentation of mine overburden or ore. Blasting has the potential to impact the surrounding community through vibration in the air (overpressure) and earth (ground vibration). The firing of blasts has the potential to generate dust and fumes. In 2015 there were nil exceedances of blast limits

3.6.1 Monitoring

Northparkes does not currently undertake surface blasting activities. Therefore monitoring for vibration and airblast overpressure at the privately owned residence, "Hubberstone" has ceased. Monitoring undertaken during Open Cut activities as stipulated in the Project Approval (11_0060) until the cessation of Open Cut mining in October 2010.

3.6.2 Management

Northparkes does not currently undertake surface blasting activities. Therefore, all associated management activities are not currently applicable. If in future surface mining activities resume, management and monitoring practices will be re-established.

3.6.3 Results

There were no surface blasts in 2015 and there were no community concerns relating to blasting in 2015.

3.6.4 Actions proposed for 2016

- Program will be reviewed if operational changes occur.

3.7 Water

Reporting period summary

- Total freshwater consumed was 1913 ML
- No significant changes to water quality or levels
- Site water infrastructure upgrades are underway

Northparkes sources water from numerous locations including imported water from various licences (refer Table 1). Water recycled from on-site ore processing facility, the tailings dam reclamation system and water collected through on-site infrastructure is all reused for mining purposes.

Water is essential in the processing of ore through Northparkes' concentrator to produce copper concentrate. Effective water management is therefore crucial to the long-term success of Northparkes' operations.

Northparkes is located in a semi-arid water stressed environment and, as such, maintains a strong focus on water management to:

- Ensure a long-term reliable water supply to site
- Minimise impacts to natural water flows and biotic systems
- Maximise water efficiency to reduce reliance on fresh water usage
- Maintain water quality

Northparkes is a zero discharge site and impact to the nearby permanent surface waters is therefore minimal.

3.7.1 Monitoring

Surface and Groundwater

Water monitoring occurs at 69 surface water and 47 groundwater sampling sites every quarter. The surface water monitoring program consists of water quality sampling of various surface water courses and drainage system locations on and off the Mine Lease. The groundwater monitoring program involves monitoring water levels and quality at various locations up gradient and down gradient from the site. The location of sampling sites is provided in Figure 25 and Figure 26.

Water monitoring occurs on a quarterly basis and ad-hoc after significant rainfall events (during flow events). Water monitoring requirements in regards to the analytical suite monitored and frequencies is displayed in Table 7 and Table 8.

All water monitoring and sample collection, storage and transportation is undertaken in accordance with Northparkes procedures which are aligned with AS/NZS 5667 – Water Quality - Sampling. Analysis of surface water and groundwater was carried out in accordance with Environment Protection Agency approved methods by a NATA accredited laboratory.

Ground and surface water impact assessment criteria is not established under Northparkes EPL 4784 as Northparkes is a zero discharge site. Northparkes assesses water quality sample results against background water quality and communicates results on a quarterly basis via the Northparkes website. Northparkes is required to publish monitoring data for some of the bores as required by EPL 4784 approval. The data is published on the Northparkes website and made available for public viewing.

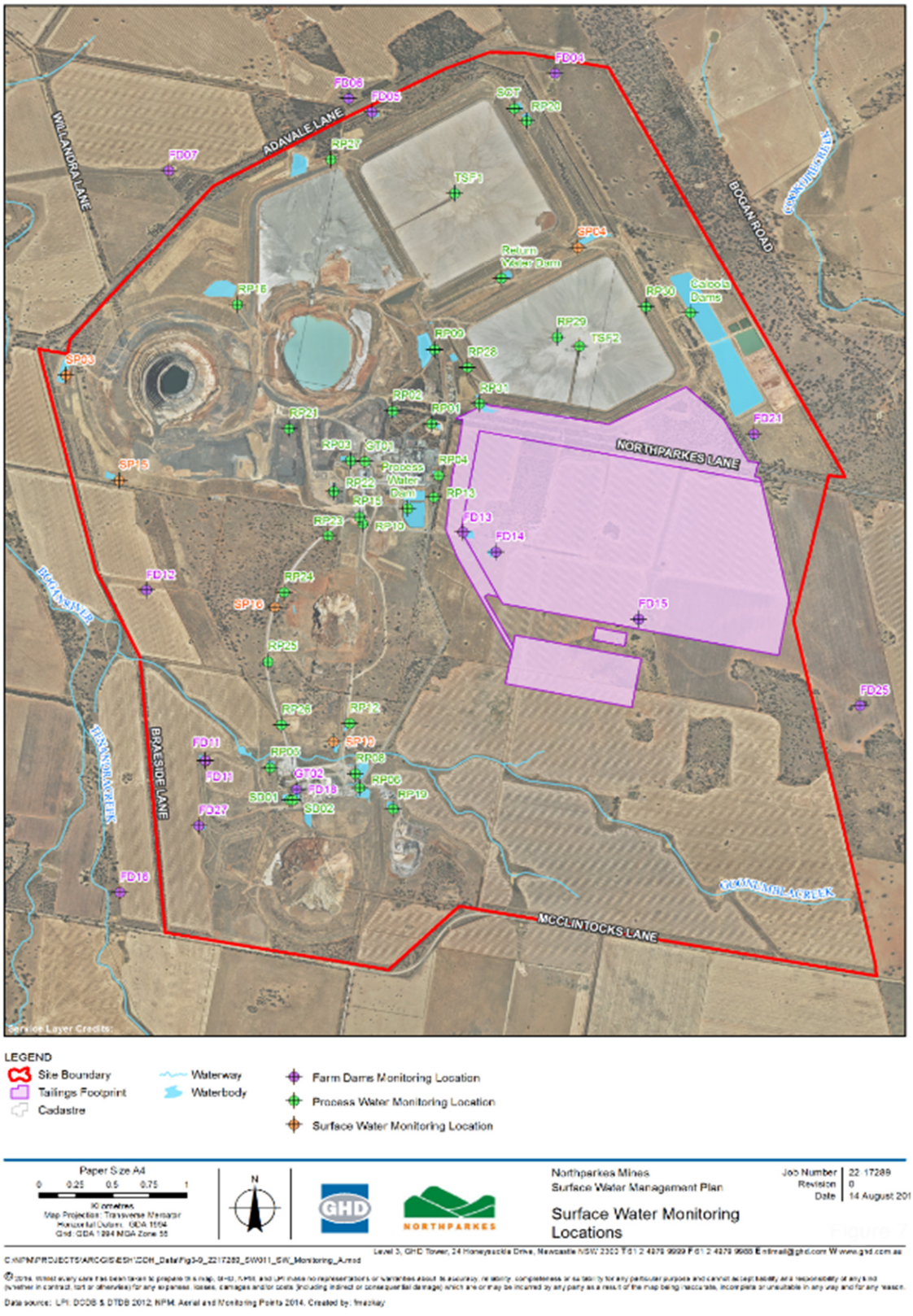
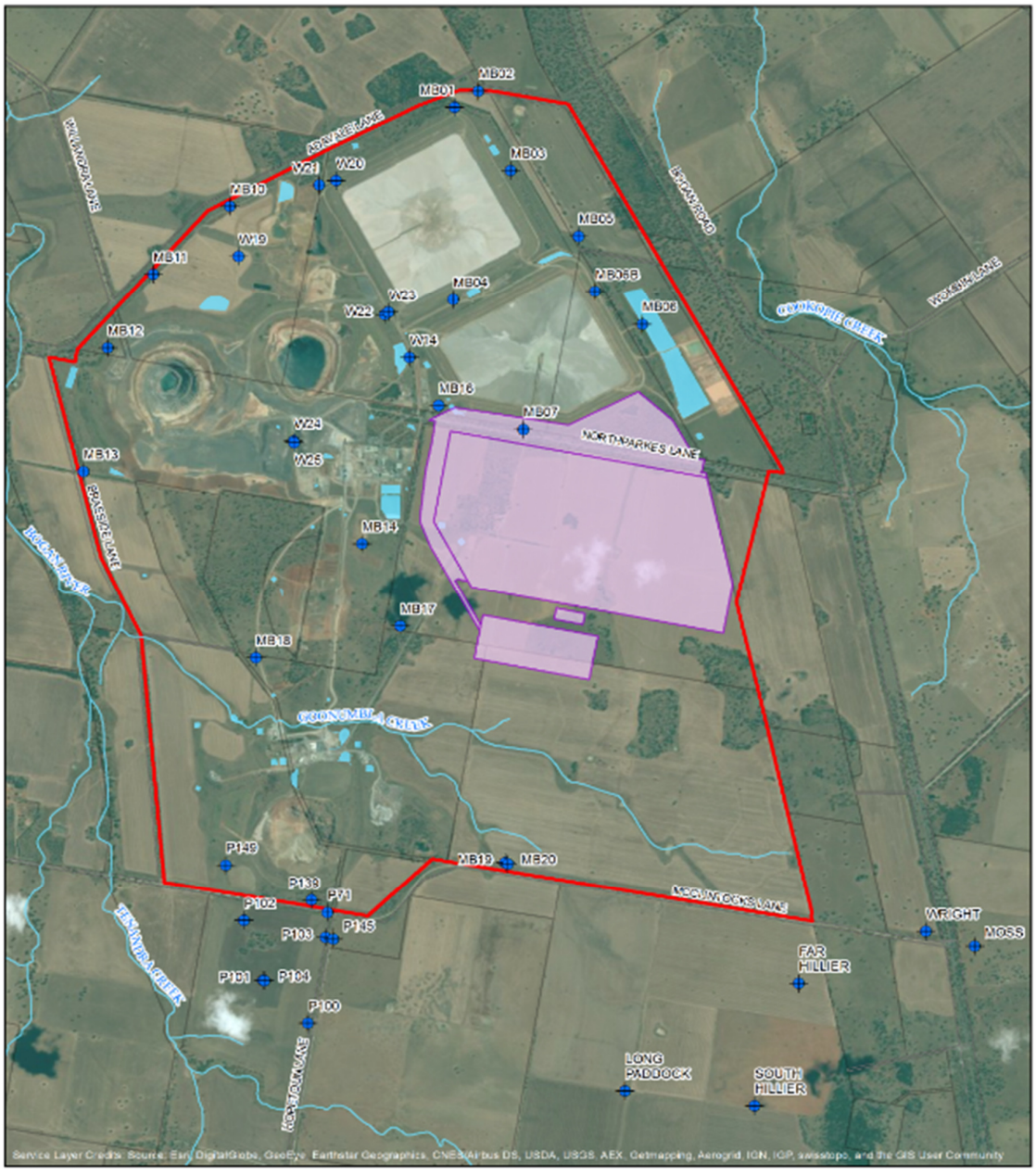


Figure 25 Northparkes Surface water monitoring locations



LEGEND

Site Boundary
Tailings Footprint
Cadastre
Waterway
Waterbody
Groundwater Monitoring Bore

Paper Size A4
0 0.3 0.6 0.9 1.2
Kilometres
Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

GHD

NORTHPARKES

Northparkes Mines
Surface Water Management Plan

Site Groundwater Monitoring Bores

Job Number 22.17289
Revision 0
Date 14 August 201

Level 3, GHD Tower, 24 Honeysuckle Drive, Newcastle NSW 2300 T 61 2 4979 9999 F 61 2 4979 9988 E ntmail@ghd.com W www.ghd.com.au

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Data source: NPM: Aerial 2014; LPI: DCDB & DTDB 2012. Created by: fmackay

Figure 26 Northparkes Groundwater monitoring location

Table 7 Surface water monitoring program

Monitoring Locations	Frequency	Analytical Suite
Watercourses	Annually and during rainfall events that results in flow	pH, EC, TSS, TDS, Cu, Na, K, Ca, Mg, Cl, SO_4, HCO_3, CO_3
Farm Dams	Bi-annually	pH, EC, TSS, Cu
	Annually	pH, EC, TSS, TDS, Cu, NA, K, Ca, Mg, Cl, SO_4, HCO_3, CO_3
Sediment Ponds	Quarterly and during rainfall events that results in flow	pH, EC, TSS, Cu
	Annually	pH, EC, TSS, TDS, Cu, NA, K, Ca, Mg, Cl, SO_4, HCO_3, CO_3
Retention Ponds	Quarterly and during rainfall events that results in flow	pH, EC, TSS, Cu
	Annually	pH, EC, TSS, TDS, Cu, NA, K, Ca, Mg, Cl, SO_4, HCO_3, CO_3
Process Water System (including process water dams, TSF's, return water dams, surge dams, retention ponds, grease traps)	Annually	pH, EC, TSS, TDS, Na, K, Ca, Mg, Cl, SO_4, HCO_3, CO_3, Al, As, Ba, Be, Cd, Co, Cu, Cr, Mo, Mn, Ni, Pb, Se, Th, U, Zn,

Table 8 Groundwater monitoring program

Monitoring Locations	Frequency	Analytical Suite
TSF Bores	Quarterly	Levels, pH, EC, Cu
	Annually	pH, EC, TDS, Na, K, Ca, Mg, Cl, SO_4, HCO_3, CO_3, Al, As, Ba, Be, Cd, Co, Cu, Cr, Mo, Ni, Pb, Se, Th, U, Zn
Opencut Bores	Quarterly	Levels, pH, EC, Cu
	Annually	pH, EC, TDS, Na, K, Ca, Mg, Cl, SO_4, HCO_3, CO_3, Al, As, Ba, Be, Cd, Co, Cu, Cr, Mo, Ni, Pb, Se, Th, U, Zn
Underground Bores	Quarterly	Levels, pH, EC, Cu
	Annually	pH, EC, TDS, Na, K, Ca, Mg, Cl, SO_4, HCO_3, CO_3, Al, As, Ba, Be, Cd, Co, Cu, Cr, Mo, Ni, Pb, Se, Th, U, Zn
Regional Bores	Quarterly	Levels, pH, EC, Cu
	Annually	pH, EC, TDS, Na, K, Ca, Mg, Cl, SO_4, HCO_3, CO_3, Al, As, Ba, Be, Cd, Co, Cu, Cr, Mo, Ni, Pb, Se, Th, U, Zn

All water monitoring and sample collection, storage and transportation is undertaken in accordance with Northparkes procedures which are aligned with AS/NZS 5667 – Water Quality - Sampling. Analysis of surface water and groundwater was carried out in accordance with Environmental Protection Agency (EPA) approved methods by a NATA accredited laboratory.

3.7.2 Management

Northparkes sources water from numerous locations including imported water from various licences (refer Table 1). Water recycled from the on-site ore processing facility and tailings dam reclamation system is collected through existing on-site infrastructure.

Effective water management is crucial to the long term success of Northparkes operations as it is essential in the processing of ore through the concentrator to produce copper concentrate.

The Northparkes water management system aims to efficiently and economically collect, store and re-use water onsite to minimise external water supply inputs and supplement supply during periods of high consumption. Water management activities and strategic actions are coordinated, managed and documented via an onsite Water Committee, with interdepartmental representation.

3.7.3 Results

The overall water quality of surface water and ground water remained consistent within long-term average. There were fluctuations observed in the surface water and groundwater quality which is largely attributable to less sediments due to low rainfall during the reporting period. The groundwater levels remained similar to the previous reporting period and within long-term averages.

Surface Water

Surface water quality was generally within the range of the long-term average for the majority of monitoring locations. The pH concentration at all sediment ponds saw a gradual increase over the reporting period. The pH concentrations were between the ranges of 5.5 to 11.5.

No samples were collected at RP2, RP4, RP7, RP16, RP21, RP22, RP24, RP25, RP26, RP27, RP29, SP16 and FD12 for the reporting period as it was dry or <10% volume throughout the year. At monitoring locations RP9, GT, DD and SCT only one sampling event occurred over the reporting period, due to the locations being dry during the remainder of the year.

Copper levels were at or below the long term averages for all monitoring locations. There were fluctuations observed at monitoring locations SP10 and SP4. The concentrations of copper reduced from previous year; but were in-line with long term averages. Copper concentrations at SP10 and SP4 decreased from 0.076 to 0.8 mg/l and from 0.206 to 0.043 mg/l and in-line with long term averages.

The copper concentrations for farm dams remained unchanged and in-line with the long term averages. At retention ponds RP15 and RP19, the copper concentrations slightly increased over all quarters in the year. Copper concentrations at RP15 and RP19 increased from 0.046 to 0.099 mg/l and from 0.037 to 0.364 ml/L in the reporting year. The increase was minimal and these monitoring locations will be observed in 2016.

Electronic Conductivity (EC uS/cm) for farm dams and sediment ponds showed no fluctuations compared to the previous years and were in-line with long-term averages. This was largely due to lack of sediments in the ponds and a result of decreased rainfall and lower water volumes. The monitoring data for all farm dams are available in Appendix 6 and sediment ponds are in Appendix 7.

pH concentrations for farm dams showed no variance and were in-line with long term averages. The pH at sediment ponds SP3 and SP10 showed fluctuations throughout the year with concentrations ranging between 6.55 to 9.15. This was attributable to lower rainfall and higher evaporation rates at the ponds.

pH concentrations at RP1, RP6, RP10, RP15, RP19 and RP23 showed variances over the reporting period. In quarter 3, the pH at RP19 showed an increase from 7.69 to 9.13. This increase was due to high evaporation rates in quarter 3. The pH concentrations at all retention ponds were in-line with the long term averages and RP19 will be closely monitored in 2016 monitoring period.

Complete results for all retention ponds monitoring are available in Appendix 8. The pH concentrations remained in-line with long term averages over the reporting period. The monitoring data for all sediment ponds and process water system are available in Appendix 7 and Appendix 9.

There were no large rainfall event which resulted in watercourse sampling. The previous monitoring results were in line with historical data and representative of freshwater quality characteristics. The complete monitoring results are available in Appendix 5.

Groundwater

Groundwater levels remained constant at all monitoring bores during the reporting period and in line with long term averages. Over the past 10 years, the groundwater levels at all bores have increased more than 2m due to higher rainfall and high infiltration rates.

The water levels at P149 bore increased significantly by 2m in Quarter (Q4) reporting period. This was due to high rate of infiltration as the bore is in close proximity to the water courses.

During the reporting period, the regional bore Moss, which is located on the 'Moss' property, was being actively pumped by the land owner and was unavailable for sampling the water level. All other regional bores were sampled and the monitoring data are available in Appendix 11.

The groundwater pH values remained consistent with long term averages with the exception of W27 and W29 of the opencut bores, which showed an increase in pH over the reporting period. An investigation revealed that the pH at these bores are consistent with long-term averages from the last ten years of monitoring data.

The groundwater pH values were consistent for all the TSF bores with the exception of W21 and W25, which has declined over the years. The EC and Copper were in line with long term averages with the exception of MB13 and MB18 with increased copper concentration in quarter 2, but declined in Q3 and Q4 to be in line with average concentrations.

Groundwater levels around the perimeter of the tailings storage facilities (TSF) remain steady, with the exception of MB3 and W29 which recorded the value of 0.036 and 0.486 mg/L an increase in copper from 0.004 mg/L to 0.007mg/L. These bores will be closely monitored in 2016 monitoring period to identify any variances.

In the reporting period no samples were collected at MB7 and MB 16 bores were dry and MB6, MB8, W15, W16, W17 and W18 which is capped as the bore is in the new tailings facility. No samples were collected from the South Hillers as the bore is blocked. Due to the windmill not working, no water pumped into the tank where the sample is usually collected. Only two samples were collected from W31, W32, MB12, MB19 and MB20 bores due to high sediment load in the bore.

The monitoring results for all bores located in the open cut and underground area are available in Appendix 10 and Appendix 13. The Copper concentrations for all monitoring bores remained in line with the long term average, except W30 and W31 which showed an increased concentrations over the monitoring period and returned to be in-line with long term averages. The EC and pH remained in-line within long term averages over the monitoring period.

The ground water levels for all the monitoring bores are steady and in-line with long term average. There were no variances in the standing water levels over the reporting period. Regional groundwater pH is variable between the bores, with quality being a variable of bore depth and underlying geology.

3.7.4 New groundwater monitoring bores

As required by the new Step Change Mine Project Approval (11_0060 Mod 1), Northparkes has installed seven new groundwater monitoring bores around the proposed new tailings storage facility as shown in Figure 27. Table 9 below shows details of the new monitoring bores.

Table 9 New groundwater bores

Monitoring bores	GPS Co-ordinates	
	Easting	Northing
W26	0598996	6358037
W27	0598997	6358028
W28	0600517	6358214
W29	0600517	6358226
W30	0601038	6357724
W31	0600393	6355938
W32	0600394	6355947

Water courses and rainfall events

Water quality in natural watercourses was subject to normal variations in range of the long-term average for the majority of monitoring locations. There were five rainfall events during the reporting period that resulted in flow of nearby watercourses and required sampling. Rainfall event sampling indicated no adverse effects from Northparkes operations on watercourse quality during the reporting period. The monitoring data for water courses sampled during rain events are available in Appendix 5. Rainfall during the reporting period was below the long-term average and no monitoring was undertaken as there were no flow events in the reporting year.

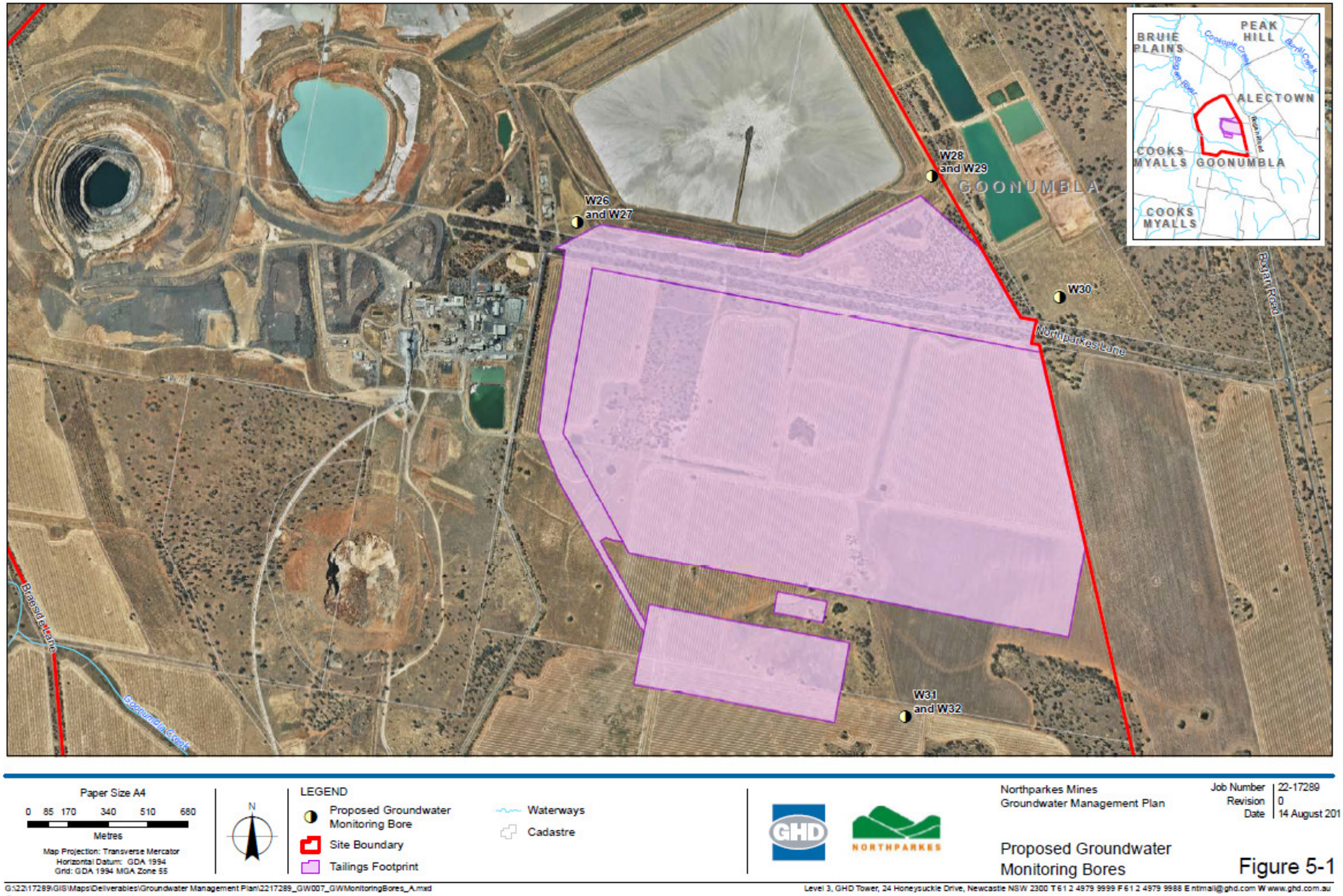

Figure 27 New groundwater monitoring bores at Rosedale tailings storage facility

3.8 Water Balance

Northparkes has implemented a water model to capture water inputs, outputs and throughputs. The GoldSim model was updated in 2014 by external consultants to incorporate the requirements from the new Project Approval (11_0060).

Results of the model are incorporated in internal management decisions and are communicated internally to the leadership team on a six-monthly basis.

In reviewing the mine water balance for the reporting period (Table 10) the following is of note:

- There were eight major rainfall events that resulted in flows during the reporting period resulting in above average rainfall, but less than 2014 reporting period. In 2015 year total of 472 mm rainfall was recorded onsite which was 10 per cent less than 2014 rainfall.
- The volume of freshwater obtained from Parkes Shire Council (PSC) increased (1808 ML in 2014 to 1913 ML in 2015) due to Rosedale tailings construction project. All water imported to site was from groundwater licence allocations. No allocations of Northparkes river water were received from Parkes Shire Council in the reporting period, as shown in Table 10.
- Total water use during the reporting period was comparable to the previous reporting period with an increase of approximately 12 per cent from 5348 ML in 2014 to 6684 ML in 2015. Water used per tonne of ore milled was higher due to more water being used to increase recovery.
- Recycled water use decreased during this reporting period by 1 percent (3540 ML in 2014 and 3480 ML in 2015). This was due to an increase in pumping of stored water in E27 into the PWS.
- Water entrained in product increased from the previous reporting period.
- Evaporation and seepage values were taken from GoldSim. The changes from the previous reporting period was largely due to the change in assumptions for evaporation as a result of E27 in-pit storage.

Table 10 Reporting period water balance

Water Balance	Total (ML)
Total Water Input	1913
Recycled	3480
Change in storage	-255
Dewatering water discharged without use	0
Process effluent	0
Non process water	1950
Entrained in product, by-products or process wastes	15.1
Sent to 3rd party	0
Make Up Water Requirement	0
Water Use	6521
Water Return	0
Evaporation, Seepage and Other	372.58
Total Water Output	6684

3.8.1 Actions proposed for 2016

- Water infrastructure upgrades for the site water storage system to build capacity
- New water storage infrastructure for Rosedale Tailings Storage Facility
- Review and update Northparkes' drought and flood management plan
- Water modelling using GoldSim software

4. LAND MANAGEMENT AND REHABILITATION

Northparkes owns and manages approximately 10,488 hectares of land within and surrounding the mine leases. This area supports a range of land uses including mining, exploration, crop production and habitat re-establishment.

Additionally, in early 2015, Northparkes finalised the freehold purchase of the Kokoda Offset Site (Kokoda), a 350 ha property located in the Mandagery locality of the Central West Slopes of NSW. Kokoda was purchased to offset the residual impacts resulting from the Northparkes Step Change Project (PA 11_0060). This project approval includes the construction of the Rosedale Tailing Storage Facility, which commenced construction in 2015 and has had a range of preclearance and clearing supervision activities associated with its construction.

Rehabilitation activities at Northparkes incorporate the entire landholding in order to enhance the regional landscape and native habitat values.

4.1 Monitoring

4.1.1 Northparkes, Farms and Adjacent Vegetation

Land management aspects are monitored on a continuous basis across the mining lease and farms through inspections conducted by the Environment and Farms team. These aspects include vegetation clearing activities, top soil management and invasive weed and animal pest mitigation.

Scheduled inspections (known as Zero Harm Operations Walks (ZHOWs)) of areas within and surrounding the Northparkes mining lease, including the farms, are undertaken either on a quarterly or biannual basis. ZHOWs assess aspects of land management, soils, water and dust.

4.1.2 Kokoda Offset Site

In 2015, the ongoing monitoring program commenced at the Kokoda Offset Site. This monitoring program will measure the success of management and restoration strategies in meeting the approval conditions and performance indicators (as outlined in the Northparkes Biodiversity Offset Management Plan (BOMP)) in a timely manner. The monitoring program incorporates annual systematic monitoring as well as biannual (twice yearly) inspections.

Biannual inspections

Biannual inspections were undertaken at Kokoda in April and October 2015 and included a broad assessment of the site condition aimed at identifying any visually obvious management issue that require immediate attention. The biannual inspections at Kokoda monitor:

- Weed and pests
- Sedimentation, erosion or salinity issues
- Natural regeneration success

During these biannual inspections of Kokoda, maintenance checks of the boundary fence, signage, tracks and homestead are also undertaken.

Rehabilitation monitoring

During the reporting period, Northparkes engaged external consultants to undertake rehabilitation monitoring at Kokoda. This program is guided by clearly defined, repeatable and consistent methodologies for monitoring changes in various aspects of ecosystem function, succession and long-term sustainability. The adopted monitoring methodology is a standard and simple procedure that can be easily replicated over any vegetation community or revegetation area. It includes a combination of Landscape Function Analysis (LFA) and flora diversity.

LFA is a technique used to assess the soil structure, stability and nutrient cycling within the Derived Native Grassland (DNG) recovery areas, which uses rapidly acquired field-assessed indicators to assess the biogeochemical functioning of landscapes (Tongway and Hindley 2004). This method is based mainly on processes involved in surface hydrology including rainfall, infiltration, runoff, erosion, plant growth and nutrient cycling. The standard LFA methods as described by Tongway and Hindley (2004) were following during surveys at Kokoda.

The annual rehabilitation monitoring surveys at Kokoda included:

- Six permanent flora plots were established in existing remnant target woodland communities (reference sites), comprising:
    - Three in Grey Box Grassy Woodland Endangered Ecological Community (EEC)
    - Three in Dwyer's Red Gum – Grey Box – Mugga Ironbark – black Cypress Pine Forest
- Eleven plots in DNG regeneration/revegetation areas, comprising:
    - Five in Grey Box Grassy woodland DNG (EEC) probable active rehabilitation areas
    - Three in Dwyer's Red Gum – Grey Box – Mugga Ironbark – Black Cypress Pine DNG probable active rehabilitation areas
    - One in Dwyer's Red Gum – Grey Box – Mugga Ironbark – Black Cypress Pine Forest low quality
    - One in White Box Grassy Woodland Critically Endangered Ecological Community (CEEC)
    - One in Grey Box – Ironbark woodland non EEC
- Sapling survivorship counts of planted tubestock and condition assessments of surviving tubestock in regeneration and revegetation areas (to start in 2015)
- Permanent photo point monitoring at each monitoring site
- A replicable stem count assessment in suitable reference (remnant woodland in target communities) and regeneration (DNG) sites for use in developing completion criteria and tracking future progress (to start in 2015)
- LFA monitoring surveys in DNG recovery areas and reference sites in remnant woodland in target communities, with 11 LFA sites were undertaken. Refer to Figure 28 for the locations of LFA monitoring sites

Data on floristics and structure, habitat features and ecological condition was also recorded at all monitoring sites.

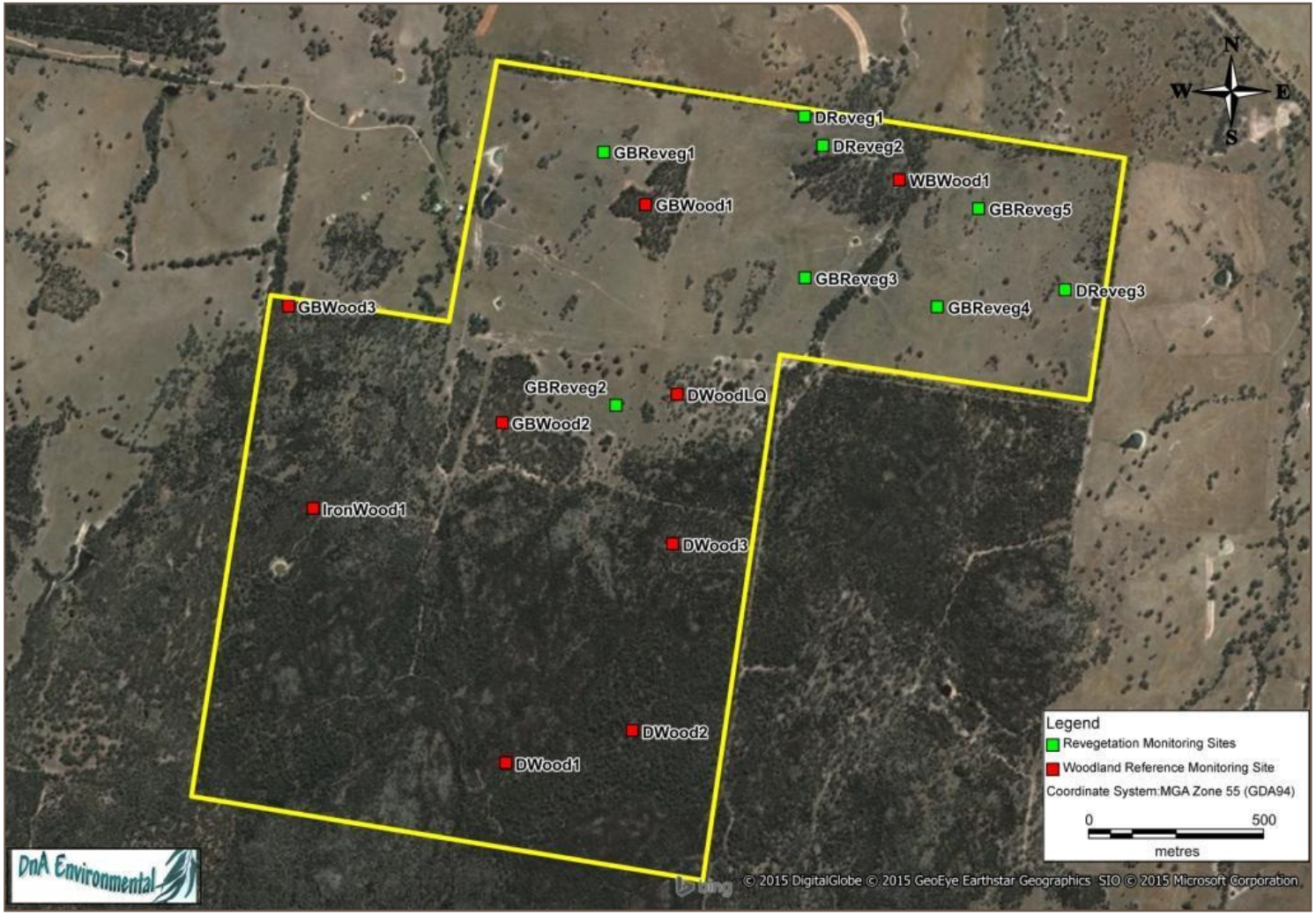

Figure 28 Locations of reference and revegetation monitoring sites

4.2 Monitoring results

4.2.1 Kokoda Offset Site

Grey Box woodlands

The three Grey Box woodland reference sites were characterised by a mature tree canopy and well-developed decomposing leaf litter layer with a sparse cover of native perennial forbs and grasses. The White Box and Ironbark woodlands also had a mature tree canopy. While both sites had a well-developed leaf litter layer, native grasses and forbs were more abundant in the White Box woodland. In comparison, in the Ironbark woodland there was an understorey of low and scattered shrubs. The Grey Box revegetation sites are degraded pastures and are structurally different to the woodland reference sites. However, they typically had good ground cover comprised of a combination of annual and perennial plants and cryptogams.

Despite the lack of a mature tree canopy, the Grey Box revegetation sites tended to be more stable than the reference sites. This was due to the higher abundance of perennial ground covers, very hard soil crusts - which usually contained a significant abundance of cryptogam cover - and there was subsequently less evidence of erosion or deposition within these sites. The revegetation sites however had a lower infiltration and nutrient recycling capacity largely due to lack of a mature overstorey, undeveloped leaf litter layer and hard surface crusts.

The White Box grassy woodland was the most ecologically functional site with the sum total score of 170.3 out of a possible score of 300. This site contained high patch area, a mature tree canopy and well developed grassy ground cover layer, with high levels of decomposing litter and very stable soils. The Grey Box woodland sites GBWood3 and GBWood2 were the next most functional communities but did not have such high levels of these attributes and scored 168.4 and 164.3 respectively. The derived grasslands GBReveg1, GBReveg4 and GBReveg3 that will be revegetated to Grey Box woodland are presently more functional than GBWood1 and the Ironbark woodland. These two woodland areas had also been severely degraded through a long grazing history. The herbaceous understorey was severely depleted and the soils compacted; these sites scored 159.7 and 159.5 respectively. The least functional communities were presently GBReveg5 which scored 155.6 and GBReveg2 with 151.8.

In the reference sites the density of trees and mature shrubs (>5cm dbh) ranged from 8 – 21 individuals and were dominated by *Eucalyptus microcarpa* (Grey Box). They were typically in good to medium health but all sites contained some examples of advanced dieback or stags. The White Box woodland was dominated by *E. albens* but a *Callitris endlicheri* and *E. blakelyi* were also present with most trees being in good to medium health and a large percentage (63 %) of them were bearing reproductive structures. The Ironbark woodland was dominated by a mixture of *E. albens, E. dealbata* and *E. sideroxylon* with several *E. microcarpa* and a single *Callitris endlicheri*. Most individuals were in medium to poor health with several dead. No trees or mature shrubs were recorded in the Grey Box revegetation areas.

Shrub and juvenile tree densities were relatively low 1one – 18 individuals (25 – 450 stems per hectare) and these were represented by one to four species. Species included juvenile *E. microcarpa, Acacia implexa, A. paradoxa* (Kangaroo Thorn), *Brachyloma daphnoides* (Daphne Heath) or *Cassinia laevis* (Cough Bush). In the White Box woodland there was one small *Acacia implexa*. In the Ironbark woodland, there were 108 individuals which were dominated by *Brachyloma daphnoides.* Most individuals in the reference sites were less than 0.5m in height. No juvenile trees or shrubs were recorded in the Grey Box revegetation areas.

Total ground cover, which is a combination of leaf litter, annual plants, cryptogams, rocks, logs and live perennial plants (<0.5m in height) was relatively high in the woodland reference sites and ranged from 90.5 – 99.5 %. In IronWood1 total ground cover was slightly lower with 86.5 % while in the White Box woodland and derived grassland revegetation sites there was 98.5 – 100 % ground cover.

In the Grey Box woodland reference sites and the White Box and Ironbark woodlands the most dominant form of ground cover was dead leaf litter. There was also a small contribution of cover provided by scattered perennial plants and fallen branches, with an occasional annual plant or rock. The White Box woodland had a higher cover of perennial ground cover, while in the Ironbark woodland, cryptogams and logs were also important. In comparison, the revegetation sites were dominated by various proportions of annual plants and dead leaf litter and had a higher cover of perennial ground covers and cryptogams. The reference sites were also characterised by a mature canopy cover which exceeded 6.0m in height with low hanging braches also providing occasional projected cover in the lower height classes. The White Box woodland had a similar overstorey structure while in Ironwood1, the scattered low shrubs provided some structural diversity 0.5 – 2.0m in height.

In the reference sites total floristic diversity was highly variable with 23 – 39 species recorded. The White Box woodland contained the highest total species diversity with 51 species, while there were 35 species recorded in the Ironbark woodland. Floristic diversity in the derived grasslands ranged from a low diversity of 30 species (GBReveg3) to a high of 45 species (GBReveg2). Native species were more diverse than exotic species in sites WBWood1, IronWood1 as well as the derived grasslands GBReveg2 and GBReveg4. While only one exotic species was recorded in IronWood1, all other sites contained more exotic species than were recorded in the woodland reference sites and were therefore weedier than desired.

In IronWood1, 100% of the live ground covers were endemic species but in the White Box woodland native species provided 78.3 %cover and was weedier than desired. In the derived grasslands the highest cover of native plants was recorded in GBReveg2 with 61.7 % endemic cover, while the lowest was recorded in GBReveg1 and GBReveg3 which had low scores of 27.2 % and 27.8 % respectively. Therefore all revegetation areas were presently dominated by exotic species and weedier than desired.

The White Box and Ironbark woodlands were comprised of an adequate representation of the major plant groups but there was a slightly low diversity of herbs in IronWood1. In the derived grassland revegetation areas there was also an adequate representation of most growth forms except that there were no tree species. While there were also no shrubs in the grassland areas, no shrubs were recorded in the GBWood01 reference site.

There were 140 species recorded across the Grey Box monitoring sites with 41 (29%) of these being exotic species. The exotic annual *Hypochaeris glabra* (Smooth Catsear) was recorded in all sites including the three reference sites and White Box and Ironbark woodlands. Exotic annuals *Arctotheca calendula* (Capeweed), *Anagallis arvensis* (Scarlet Pimpernel) and *Briza minor* (Shivery Grass) were also very common. Common native species included *Aristida ramosa* (Threeawn Grass), *Austrostipa scabra subsp. falcata* (Speargrass), *Bothriochloa macra* (Red-leg Grass), *Elymus scaber* (Common Wheatgrass) and *Cheilanthes sieberi subsp. sieberi* (Rock Fern).

In the Grey Box woodland reference sites no species was particularly abundant in the understorey with only *Austrostipa scabra subsp. falcata* (Speargrass) meeting the required criteria in one site (GBWood01). *Austrostipa scabra subsp. falcata* was also the most abundant in the White Box woodland along with *Hydrocotyle laxiflora* (Stinking Pennywort). In the Ironbark woodland *Brachyloma daphnoides* (Daphne Heath) provided the most ground cover. The derived grasslands were dominated by a different range of species with most cover provided exotic annual grasses especially *Vulpia muralis* (Rats-tail Fescue) and *Aira cupaniana* (Silvery Hairgrass). Other common species included the exotics *Trifolium angustifolium* (Narrow-leaf Clover) and *Hypochaeris glabra* (Smooth Catsear) and the natives *Bothriochloa macra* (Red-leg Grass) and *Rytidosperma racemosum* (Wallaby Grass).

The soils in the Grey Box reference sites were very strongly acidic, with the remaining sites being similar to or within desirable levels and were non-saline and non-sodic. Most sites were also low in organic matter, Phosphorous and CEC. The results indicate there were slight to moderately elevated levels of potassium and significantly high concentrations of iron in most of the Grey Box sites, including the three reference sites indicating these may be naturally occurring.

Performance of the woodland revegetation monitoring sites against "proposed" Primary Completion Performance Indicators

The table below indicates the performance of the woodland revegetation monitoring sites against a selection of proposed Primary Completion Performance Indicators. The selection of criteria has been presented in order of rehabilitation phases according to the ESG3 MOP guidelines (*excluding Phase 1: Decommissioning*). The range values of the ecological performance targets are amended annually. Revegetation sites meeting or exceeding the range values of their representative community type i.e. Grey Box woodland reference sites have been identified with a coloured box and have therefore been deemed to meet these primary completion performance targets this year. Hashed coloured boxes indicate they may be outside of the reference target ranges, but within acceptable agricultural limits.

Table 11 Performance of the Grey Box revegetation sites against primary completion performance indicators for Grey Box woodland communities in 2015.

Rehabilitation Phase	Aspect or ecosystem component	Performance Indicators	Unit of measurement	Grey Box Woodland ecosystem range 2015		GBReveg 1	GBReveg 2	GBReveg 3	GBReveg 4	GBReveg 5	WBWood 1	IronWood 1
Performance indicators are quantified by the range of values obtained from replicated reference sites				Lower	Upper	2015						
Phase 2: Landform establishment and stability	Active erosion	No. Rills/Gullies	No.	0	0	0	0	0	0	0	0	0
Phase 3: Growth medium development	Soil chemical, physical properties and amelioration	pH	pH (5.6 - 7.3)	4.9	5.2	6.5	5.8	6.1	5.9	6.0	5.8	5.0
		Organic Matter	% (>4.5)	4.7	7.8	2.6	4.6	1.9	1.7	2.2	1.5	4.2
		Nitrate	ppm (>12.5)	1.5	1.8	2.6	2.1	2.3	2.5	2.2	1.8	1.5
Phase 4: Ecosystem & Landuse Establishment	Landscape Function Analysis (LFA): Landform stability and organisation	LFA Stability	%	62.8	65.0	73.6	73.0	72.0	71.0	69.1	62	62.4
		LFA Landscape organisation	%	100	100	100	100	100	100	100	100	100
	Vegetation diversity	Diversity of shrubs and juvenile trees	species/area	1	4	0	0	0	0	0	1	7
			% population	100	100	0	0	0	0	0	100	100

Rehabilitation Phase	Aspect or ecosystem component	Performance Indicators	Unit of measurement	Grey Box Woodland ecosystem range 2015		GBReveg 1	GBReveg 2	GBReveg 3	GBReveg 4	GBReveg 5	WBWood 1	IronWood 1
		Exotic species richness	<No./area	6	7	18	13	17	16	18	12	1
	Vegetation density	Density of shrubs and juvenile trees	No./area	1	18	0	0	0	0	0	1	108
	Ecosystem composition	Trees	No./area	1	2	0	0	0	0	0	3	6
		Shrubs	No./area	0	3	0	0	0	0	0	1	6
		Herbs	No./area	14	20	20	32	18	17	21	33	12
Phase 5: Ecosystem & Landuse Development	Landscape Function Analysis (LFA): Landform function and ecological performance	LFA Infiltration	%	49.7	53.5	46.2	38.4	43.3	44.3	42.9	54.4	51.1
		LFA Nutrient recycling	%	47.2	50.7	41.6	40.4	44.6	46	43.6	53.9	46
	Protective ground cover	Perennial plant cover (< 0.5m)	%	3	7	18	34	25	17	15.5	19.5	5.5
		Total Ground Cover	%	91	100	99	98.5	100	100	100	100	86.5

Rehabilitation Phase	Aspect or ecosystem component	Performance Indicators	Unit of measurement	Grey Box Woodland ecosystem range 2015		GBReveg 1	GBReveg 2	GBReveg 3	GBReveg 4	GBReveg 5	WBWood 1	IronWood 1
	Native ground cover abundance	Percent ground cover provided by native vegetation <0.5m tall	%	**90.5**	**97.1**	**27.2**	**61.7**	**27.8**	**36.5**	**31.4**	**78.3**	**100**
	Ecosystem growth and natural recruitment	shrubs and juvenile trees 0 - 0.5m in height	No./area	**1**	**13**	**0**	**0**	**0**	**0**	**0**	**0**	**78**
		shrubs and juvenile trees 1.5 - 2m in height	No./area	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	Ecosystem structure	Foliage cover 0.5 - 2 m	% cover	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**3**
		Foliage cover >6m	% cover	**50**	**52**	**0**	**0**	**0**	**0**	**0**	**28**	**26**
	Tree diversity	Tree diversity	%	**100**	**100**	**0**	**0**	**0**	**0**	**0**	**100**	**100**
	Ecosystem health	Live trees	% population	**85**	**100**	**0**	**0**	**0**	**0**	**0**	**100**	**82.5**

Rehabilitation Phase	Aspect or ecosystem component	Performance Indicators	Unit of measurement	Grey Box Woodland ecosystem range 2015		GBReveg 1	GBReveg 2	GBReveg 3	GBReveg 4	GBReveg 5	WBWood 1	IronWood 1
		Healthy trees	% population	5	48	0	0	0	0	0	50	10
		Flowers/fruit: Trees	% population	0	10	0	0	0	0	0	62.5	17.5

Dwyer's Red Gum woodlands

The Dwyer's Red Gum (DRG) woodland reference sites were also characterised by having a mature tree canopy, a well-developed decomposing leaf litter layer and a sparse cover of native perennial forbs and grasses. The low quality Dwyer's Red Gum woodland site was characterised with having an open mature tree canopy, moderate cover of annual and perennial ground cover species and typically had a well-developed leaf litter layer, but this was patchy. The Dwyer's Red Gum revegetation sites presently existed as degraded grasslands but they typically had good ground cover comprised of a combination of annual and perennial plants and cryptogams.

DWood1 was the most ecologically functional site with a total sum of LFA scores of 176.3 out of a possible 300. DReveg1, DReveg2 and the low quality woodland DWoodLQ were the next most functional sites and had a sum of scores which exceeded the reference sites DWood2 and DWood3 which scored 159.6 and 151.9 respectively. The lowest ecological function was recorded in DReveg3 with a sum of indices of 150.2. All DRG revegetation sites did not yet meet many completion targets related to the mature tree and shrub populations and the structural complexity of the sites due to the lack of a well-developed canopy and shrub understorey. In most of the revegetation sites there was often an appropriate diversity of native herbs and grasses but the sites also tended to be dominated by exotic species and were weedier than desired.

There were 9 – 25 trees and/or mature shrubs (>5cm dbh) in the DRG reference sites, equating to a density of 225 – 625 stems per hectare. There were nine individuals in the low quality woodland but none were yet present in the derived native grassland sites. They were typically in medium health but there were also a large percentage of stags in DWood1 and DWood2 as a result of self thinning. No mistletoe was recorded however a large percent of the population were bearing reproductive structures such as buds, flowers or fruits in DWood3. There was a very small percentage containing hollows suitable for nesting sites (>10cm). In the low quality woodland all trees were in medium health and almost half (44%) of them were bearing fruit. The DRG reference sites were dominated by *Callitris endlicheri* but there may also have been scattered individuals of *Allocasuarina luehmannii, E. dwyeri, E. dealbata, E. sideroxylon* and/or *E. microcarpa*. The low quality woodland was dominated by *E. dwyeri* and contained one *E. albens*.

There was a large variation on the number of shrubs and juvenile trees (<5cm dbh) recorded in the reference sites with densities ranging from 32 – 598 individuals equating to a density of 800 – 14950 stems per hectare with 87% of these being less than 0.5m in height. In the low quality woodland there were eight small shrubs and juvenile trees. In the woodland reference sites there were 4- 7 species of shrubs and juvenile trees with the most abundant species being young *Callitris endlicheri* seedlings. There were also low occurrences of range of other species including *Acacia doratoxylon* (Spearwood), *Brachyloma daphnoides*, *E. dwyeri*, *E. sideroxylon*, *Allocasuarina verticillata* (Drooping She oak) and *Cassinia laevis* (Cough Bush). In DWood3 there was a relatively high abundance of *Calytrix tetragona* (Fringe Myrtle). In DReveg1 there were nine *E. dwyeri* saplings and while most height classes were represented the majority were less than 1.5m in height. No shrubs or juvenile trees were recorded in the remaining grassland sites.

Total floristic diversity recorded within the 20 x 20m monitoring sites ranged from 31 – 49 species but the low quality woodland contained the highest total species diversity with 50 species Floristic diversity in the derived grassland sites was variable and ranged from a low diversity of 27 species in DReveg2 to a high of 40 species in DReveg3. In the reference sites there were 2 – 8 exotic species with only eight exotic species also being recorded in DReveg2. The remaining sites had more exotic species than desired.

Total ground cover in the DRG woodland reference sites ranged from 91.0 – 96.5%, which was similar in the low quality woodland. In the derived grasslands there was at least 99.5% ground cover. In the reference sites and the low quality woodland the most dominant form of ground cover was dead leaf litter, with a small contribution of cover provided by scattered perennial and annual plants and cryptogams. There was some cover provided by fallen branches and there may have been an occasional rock. The low quality woodland had similar features in similar proportions but did not tend to have fallen branches. The reference sites and the low quality woodland were also characterised by having a mature canopy cover which exceeded 6m in height with low hanging branches and scattered shrubs also providing occasional projected cover in the lower height classes. In comparison the revegetation sites were presently dominated by various proportions of annual plants and dead leaf litter but had similar proportions of perennial ground covers and cryptogam cover. Some taller grass tussocks may have provided a small amount of vertical structure but they did not yet have a shrub or mature tree layer.

In the reference sites most of the live plant cover was provided by native species with endemic plants providing 73.6 – 90.1% of the total plant cover. There was a slightly lower abundance of native species in DWoodLQ with 65.8% and was slightly weedier than desired. In the derived grasslands the highest cover of native plants was recorded in DReveg2 with 62.5% endemic cover. In DReveg1 and DReveg3 exotic species dominated the sites with only 33.0% and 32.1% endemic plant cover respectively. Therefore all grassland sites were presently dominated by exotic species and weedier than desired.

In the reference sites herbs were the most diverse plant group with 16 - 28 different species followed by grasses with 5 – 8 species. There were four tree species, 2 – 6 shrub species and one sub-shrub was recorded in all three sites. There were up to 2 reed species and all sites had one species of fern. The low quality DRG woodland had similar composition of the herbaceous ground covers, but it had a low diversity of tree species and no sub – shrubs were recorded. In the grassland revegetation areas there was also an adequate representation of most growth forms in the herbaceous ground covers but there was presently a low diversity of trees and shrubs and no sub-shrubs were recorded.

There were 126 species recorded across the Dwyer's Red Gum monitoring sites with 41 (33%) of these being exotic species. The exotic annual *Hypochaeris glabra* (Smooth Catsear) and *Vulpia muralis* (Rats-tail Fescue) were recorded in all sites including the three reference sites and so was the native fern *Cheilanthes sieberi subsp. sieberi* (Rock Fern). Other common exotic annuals were *Aira cupaniana* (Silvery Hairgrass), *Arctotheca calendula* (Capeweed) and *Briza minor* (Shivery Grass). Some common native species included the native perennial grasses *Aristida ramosa* (Threeawn Grass) and *Bothriochloa macra* (Red-leg Grass). Native herbs *Bulbine bulbosa* (Bulbine Lily), *Drosera peltata* (Pale Sundew), *Stuartina muelleri* (Spoon Cudweed) and *Triptilodiscus pygmaeus* (Austral Sunray) were also relatively common.

No species was particularly abundant in the understorey in the Dwyer's Red Gum woodland reference sites DWood2 and DWood3. However in DWood1, the native perennial ground covers *Cheilanthes sieberi subsp. sieberi* and *Gonocarpus elatus* (Hill Raspwort) were relatively abundant but so was the exotic annual *Hypochaeris glabra.* The derived grasslands also tended to have a high abundance of *Hypochaeris glabra,* with other annual species including *Vulpia muralis* and *Aira cupaniana* also being abundant in some sites. The native grasses *Aristida ramosa, Bothriochloa macra* and *Rytidosperma fulvum* were relatively abundant in DReveg1 and/or DReveg2

The soils were moderately to strongly acidic and non-saline; However, the exchangeable sodium percentage (ESP) slightly exceeded the 5% threshold in DReveg1 and DWoodLQ and may be sodic. All sites were also low in organic matter, phosphorous, nitrate and CEC but were typically quite similar to the DRG woodland reference sites. The results also indicate there are significantly high concentrations of iron in all of the Dwyer's Red Gum sites, including the three reference sites and are likely to be typical of the area.

Performance of the DRG woodland revegetation monitoring sites against "proposed" Primary Completion Performance Indicators

The table below indicates the performance of the woodland revegetation monitoring sites against a selection of proposed Primary Completion Performance Indicators. The selection of criteria has been presented in order of rehabilitation phases according to the ESG3: Mining Operations Plan (MOP) guidelines (*excluding Phase 1: Decommissioning*). The range values of the ecological performance targets are amended annually. Revegetation sites meeting or exceeding the range values of their representative community type i.e. Dwyer's Red Gum woodland reference sites have been identified with a coloured box and have therefore been deemed to meet these primary completion performance targets this year. Hashed coloured boxes indicate they may be outside of the reference target ranges, but within acceptable agricultural limits.

Table 12 Performance of the Dwyer's Red Gum revegetation sites against primary completion performance indicators for Dwyer's Red Gum woodland communities in 2015.

Rehabilitation Phase	Aspect or ecosystem component	Performance Indicators	Unit of measurement	Dwyer's Red Gum Woodland ecosystem range 2015		DReveg 1	DReveg 2	DReveg 3	DWoodL Q
Performance indicators are quantified by the range of values obtained from replicated reference sites				Lower	Upper	2015	2015	2015	2015
Phase 2: Landform establishment and stability	Active erosion	No. Rills/Gullies	No.	0	0	0	0	0	0
Phase 3: Growth medium development	Soil chemical, physical properties and amelioration	pH	pH (5.6 - 7.3)	5.2	5.4	5.5	5.3	5.9	5.2
		Organic Matter	% (>4.5)	2.3	3.5	2.4	2.4	2.9	2.3
		Nitrate	ppm (>12.5)	1.4	2.3	2.3	1.7	2.5	1.6
Phase 4: Ecosystem & Landuse Establishment	Landscape Function Analysis (LFA): Landform stability and organisation	LFA Stability	%	63.1	70.0	75.0	71.3	69.2	66.5
		LFA Landscape organisation	%	100	100	100	100	100	100
	Vegetation diversity	Diversity of shrubs and juvenile trees	species/area	4	7	1	0	0	3
			% population	100	100	100	0	0	100

Rehabilitation Phase	Aspect or ecosystem component	Performance Indicators	Unit of measurement	Dwyer's Red Gum Woodland ecosystem range 2015		DReveg 1	DReveg 2	DReveg 3	DWoodL Q
		Exotic species richness	<No./area	2	8	17	8	22	17
	Vegetation density	Density of shrubs and juvenile trees	No./area	32	598	9	0	0	8
	Ecosystem composition	Trees	No./area	4	4	1	0	0	2
		Shrubs	No./area	2	6	0	0	0	2
		Herbs	No./area	16	28	20	17	26	32
Phase 5: Ecosystem & Landuse Development	Landscape Function Analysis (LFA): Landform function and ecological performance	LFA Infiltration	%	43.6	54.6	47.1	46	40.1	49.9
		LFA Nutrient recycling	%	44.5	51.7	43.4	46.4	40.9	46.9
	Protective ground cover	Perennial plant cover (< 0.5m)	%	4	28	8.5	10.5	9.5	10.5
		Total Ground Cover	%	91	97	99.5	100	100	97
	Native ground cover abundance	Percent ground cover provided by native vegetation <0.5m tall	%	73.6	90.1	33.0	62.5	32.1	65.8

Conclusions and Management Recommendations

The proposed revegetation activities within the derived grassland areas as described in the Northparkes BOMP aim to increase biodiversity and habitat values through the removal of livestock grazing to allow natural regeneration, supplemented with tubestock planting. These activities are likely to result in the cleared grassland areas developing into woodland communities and therefore meeting most ecological performance indicators in the medium to longer term. The reference sites at Kokoda are typically degraded and of low quality which subsequently have provided low performance targets. In the Grey Box woodlands in particular, there was limited abundance and diversity of the grassy understorey and there were limited shrubs. Subsequently the revegetation activities proposed should include a range of species known to occur within these communities and not just restricted to those occurring within the existing reference sites.

Strategic grazing is also likely to be a critical management strategy which will be required to maintain biodiversity, encourage tree and shrub regeneration and to reduce fuel loads as part of the integrated and adaptive management strategy for the Kokoda Offset Area. As part of the BOMP it would be beneficial to implement strategic grazing management to manipulate the grassy understorey biomass in order to:

- Promote natural tree and shrub recruitment
- Reduce cover abundance of exotic annual grasses, in favour of native perennial grasses (grazing late summer/early autumn and/or late winter early spring)
- Promote and maintain diversity in the herbaceous understorey cover
- Reduce understory growth in preparation for direct seeding and/or tubestock planting;
- Reduce the incidence of bush-fire and bush-fire intensity
- Prevent invasion from weeds via the maintenance of strong native perennial pastures and high ground cover levels
- Assist ongoing site maintenance and monitoring by providing better access around the property

Other potential management issues at Kokoda may be related to high density *Callitris endlicheri* regeneration which was observed to be occurring within and adjacent to woodland areas where mature Callitris were present. Strategic grazing may reduce the density of existing seedlings and regulate the degree of Callitris regeneration through manipulation of the herbaceous understorey and germination niches.

Herbivory by feral and pests species may also become an increasingly important management issue which should be regularly monitored as specified in the BOMP. Safe and easy access should always be maintained around main access tracks and boundary fences to facilitate monitoring, property maintenance and bushfire management. Regular inspections should be undertaken with slashing and/or strategic grazing management implemented on a needs basis. There were little other management issues that have not already been addressed in the BOMP.

4.3 Management

4.3.1 Northparkes, Farms and Adjacent Vegetation

Land management is conducted in accordance to the Landscape Management Plan and is inclusive of the Mine Closure Plan, the Rehabilitation Management Plan and the Void Management Plan. Other management plans pertaining to land management include the Aboriginal Heritage Management Plan and the Flora and Fauna Management Plan. The key objectives for Northparkes are to develop an integrated and strategic approach to land management including:

- Reducing Northparkes' footprint and impacts
- Land preservation and rehabilitation
- Conservation and improvement of biodiversity
- Land conservation through sustainable agricultural management
- Establishment of environmental offsets on the Northparkes properties
- Interaction with adjoining land holders and communities to address cross border and regional land use issues

Agricultural land around the mine site is used primarily for crop farming in combination with native vegetation. Some of the native vegetation areas around the mine site serves as biodiversity offsets for the mining operations (such as Estcourt Offset Site and the Limestone State Forest) while other provide wildlife corridors facilitating fauna movement and gene flow across the broader landscape. Since acquiring its various land holdings, Northparkes has placed considerable emphasis upon sustainable agricultural practices to minimise off-site impacts including:

- Removal of stock to minimise impacts to soil and vegetation;
- Conservation tillage practices;
- Soil conservation works; and
- Stubble retention.

Northparkes has maintained large sections of remnant vegetation within its landholding wherever possible. An important component of the rehabilitation strategy is the development and implementation of revegetation plans that link the significant areas of remnant vegetation with wildlife corridors and enhance ecological value.

Revegetation activities are designed for erosion control, aesthetic improvement and ecosystem regeneration. These activities are undertaken on constructed landforms such as waste rock dumps, tailings storage facilities, topsoil stockpiles, and other disturbed areas. Revegetation is also undertaken to create wildlife corridors. Northparkes has committed to planting 10,000 trees in wildlife corridors on an annual basis.

The three year rehabilitation plan is provided in Table 13.

Table 13 Three year rehabilitation plan

LOCATION	DATE	AREA	REHABILITATION METHOD	MATERIAL TYPE	COMMENTS
Open Cut Operations					
Sound bund (W1, W2, W3, W4) Waste Stockpile	>2015	W4 outer batters	Stable slopes, capping, seeding	Clay, oxide, topsoil	Areas stabilised. W4 outer batters rehabilitated in 2011. Waste stockpiles will be utilised for ongoing construction of tailings storage facilities.
Miscellaneous Areas	As required	Roads, topsoil stockpiles	Ripped, seeding	Topsoil	-
E22 Void	>2015	Inside sound bund	Stable slopes. Capped and rehabilitated if not filled with tailings.	Topsoil/Rock/Clay	Current life of mine plan entails development of a block cave at E22. Thus rehabilitation will not occur until post mining.
E27 Void	>2015	Outer batters and cap	Stable slopes, seeding	Topsoil/Rock	Final rehabilitation after TSF decommissioning.
Underground Operations					
E26 Void	>2015	Subsidence Zone	Seeding , drainage repairs	Rock armour, Topsoil	Final void rehabilitation at end of mine life.
E26 Laydown and Portal Areas	As required	Hardstand areas	Seeding	Topsoil	Concrete Batch Plant, PYBAR laydown area, other contractors.
E26 Lift 2 Waste Stockpile	>2015	Cap	Sealed with clay, topsoiled, seeded	Clay, Topsoil	Rehabilitation requirements dependant on assessment of physical and geochemical properties and use as construction material.
E48 Void	>2015	Subsidence Zone	Seeding , drainage repairs	Rock armour, Topsoil	Final void rehabilitation at end of mine life.
Exploration and Evaluation					
Drilling activities	As required	Drill pads and sumps	Hole capping, sump filling	Topsoil	Exploration drilling activities on Mining Lease and Exploration leases.

Ore Processing					
TSF 1	>2015	Walls and cap	Native seed broadcasting	Topsoil/Rock/Clay	Final rehabilitation after decommissioning.
TSF 2	>2015	Walls and cap	Native seed broadcasting	Topsoil/Rock/Clay	Final rehabilitation after decommissioning.
TSF 3	>2015	Walls and cap	Native seed broadcasting	Topsoil/Rock/Clay	Final rehabilitation after decommissioning.
TSF 4 (Estcourt)	>2015	Walls and cap	Native seed broadcasting	Topsoil/Rock/Clay	Final rehabilitation after decommissioning.
Borrow Pits (Caloola, Estcourt)	As required	Walls	Native seed broadcasting	Topsoil/Rock/Clay	Ongoing material for TSF construction.
Agricultural Properties					
Estcourt Offset Site	Ongoing	23 ha agricultural land	In accordance with approved VMP	Topsoil	Natural regeneration currently continuing.

4.3.2 Kokoda Offset Site

Kokoda is managed in accordance with the Northparkes BOMP, which outlines the short, medium and long-term management strategies, monitoring actions, performance and completion criteria for Kokoda. Northparkes commenced implementation of the BOMP in 2015.

4.3.3 Revegetation and Rehabilitation

Rehabilitation works during 2015 have been associated with the rehabilitation of temporary drill pads established as part of Northparkes exploration drilling program. During 2014 and 2015, planting occurred on the southern boundary of Northparkes agricultural property '*Kundibah*', in addition to the northern boundary on the agricultural property '*Orana*'.

4.4 Research and Rehabilitation Trials and Use of Analogue Sites

Northparkes has been working with the CMLR on a series of studies associated with the rehabilitation of TSFs from 2008.

The CLMR work has been undertaken in four stages.

- Stage 1 - Review of site environmental data and literature review
- Stage 2 - Field sampling of geochemical and physical characteristics
- Stage 3 - Hydrological and geochemical modelling
- Stage 4 - Conduct small scale field trials to validate required cover system

Stages 1 to 3 have been completed and currently Stage 4 is in progress. Stage 4 results will be available during this MOP period. This information will be the driver for the TSF capping design requirements.

Based on the results of Stages 1-3 the following criteria in regard to cover performance are being investigated:

- Depth of cover (relates to deep drainage, storage of rainfall, salt movement, run off and plant growth
- Depth of topsoil (relates to plant growth, run off, precipitation storage)

The trials have been restricted to 100mm of topsoil due to constraints on topsoil volumes. Waste rock has been substituted for plant growth material below the topsoil. The waste rock is benign and suitable for plant growth and water storage.

The Stage 4 field trials involve setting up four small trial plots 20m X 20m with different levels and layers of cover over the tailings. In each of these trial plots different arrays of suction plates, suction sensors and moisture sensors have been installed. The design depth of each plot is illustrated below in Figure 29.

Plots have been seeded with native summer grasses: red grass (*Bothriochloa macra*), windmill grass (*Chloris truncate*), kangaroo grass (*Themeda triandra*) and warrego grass (*Paspalidium jubiflorum)* at 0.2 g./m^2; and native saltbush varieties of Yanga bush (*Maireana brevfolia*) at 0.3g/m^2, creeping saltbush (*Atriplex semibaccatta*) and Ruby saltbush (*Enchyleana tomentosa*), both at 0.4g/m^2.

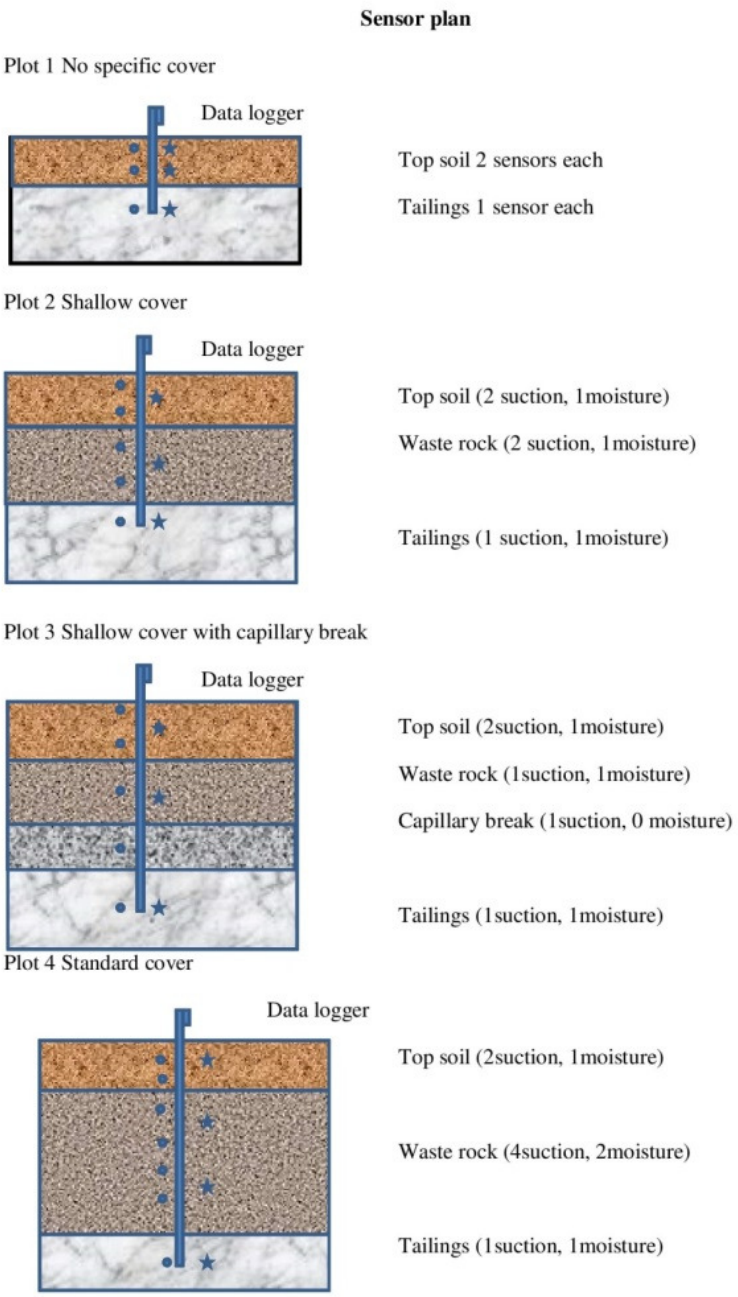

Figure 29 Design depths of capping trail plots

Table 14 Stage 4 Capping trail design specifications

Design	Plot 1	Plot 2	T3	T4
	No specific cover	Shallow cover	Shallow cover with capillary break	Standard cover
Topsoil [m]	0.1	0.1	0.1	0.1
Waste rock [m]	--	0.4	0.4	0.9
Capillary break [m]	--	--	0.3	--
Total trial depth [m]	'0.1'	0.5	0.8	1
Water balance parameters to be monitored:				
Suction (# of sensors)	3	5	5	7
Moisture content (# of sensors)	3	3	3	4
Deep drainage with suction plate	1	1	1	1
Geochemical parameters to be monitored				
Seepage quality	✔	✔	✔	✔
Potential salt movement from tailings into cover	✔	✔	✔	✔

4.5 Analysis

The research trials evidenced that the tailings at Northparkes generally contain low concentrations of sulphide bearing minerals and some residual metals from processing such as copper. Physically, they are characterised by relatively low hydraulic conductivity and small percentage of continuous macro-pores, which has limited free drainage but shows crack development close to the surface.

Vegetation establishment is critical for the stabilisation of the TSF surface against water or wind erosion. It positively supports the reduction of moisture in the cover and improves the buffer capacity for rainfall. Based on the results from previous studies and numerical modeling on the hydrology of various scenarios of cover designs, four different designs were selected for a field trial.

The following criteria for an optimal cover design informed the decision for the field trial plots:

- Avoidance of deep drainage □
- Sufficient depth of soil for plant growth □
- Storage of precipitation □
- Prevention of upward salt movement □

The critical design criteria based on the findings of the previous studies were summarised as depth of cover and depth of topsoil. Modelling of the water balance for various cover design scenarios showed that for the climatic conditions of Northparkes, the contribution of vegetation to extract moisture from the cover could greatly improve the performance, i.e., reduces the risk of deep

drainage. The maximum depth from which upward water flow caused by evaporation has been derived from modeling is approximately 1.8 to 2m. This depth would ensure avoidance of surface salt accumulation. In case of shortcomings of topsoil or other fine textured material, upward flow from a saline subsurface layer can be interrupted by a capillary break layer, consisting of coarse competent rock, which would allow a reduction of the cover thickness.

Four test plots (plot A, B, C, D) of different cover design were constructed. The tailings of all plots were ripped prior to cover construction. This was to help plant roots overcome mechanical resistance for potential root growth into the tailings and to enable vegetation to access tailings as a water source. A 0.1m topsoil layer enriched with organic matter (hay) was common to all plots. This layer was placed either directly on tailings or on a fine material containing waste rock submaterial of 0.4 and 0.9m thickness respectively. A further design contained a capillary break layer of 0.3m of coarse waste rock underneath the topsoil/0.4m submaterial layer. All plots were seeded with a grass seed mix of local species and irrigated.

All plots were equipped with soil moisture monitoring sensors recording water content and water potential in various depths and electrical conductivity at these depths. For events of deep drainage following rainfall, a set of 16 suction plates were installed at each plot close to the surface of the tailings and covered with sand. Controlled by the lowest soil water potential sensor, the suction plates were switched on once the water potential passed the threshold for gravitational flow (-10kPa) to capture any free draining water. The amount of water was manually recorded at defined time intervals.

Since commissioning of the trials in July 2014, during half yearly maintenance visits, topsoil was collected from three depths (0-2, 2-5 and 5-10cm) and bulk chemical parameters pH and electrical conductivity were measured.

The climate during this period was drier than average with about 50 per cent of the normal rainfall amount in the second half of 2014 and just over two-thirds of average rainfall for the year 2015.

The monitoring results of soil moisture over this period of one and a half years show a direct response to larger rainfall (> 15mm/day) with water flow to depth for all plots constructed with a rock cover. The immediate response to depth, which is in some cases was not noticeable in the sensor measurements closer to the surface, is a clear indicator for preferential flow, i.e., once the water absorption capacity of the topsoil layer has been exceeded during the rain event, water will flow through the rock cover layer towards the tailings. The low hydraulic conductivity and the high water absorption capacity of the tailings allows water to be stored at that depth. The plot with direct application of topsoil onto tailings responds equally to the rain events, but stores water throughout the shallow profile.

For all plots a trend of a decrease of soil moisture at depth, i.e. in the transition zone from constructed cover to tailings, is noticeable despite the fact that precipitation was slightly higher in 2015 compared to the 2014 period. A period of multiple rain events in the first half of July 2015 accumulating to 62mm of rain moistened all of the profile in all plots. These higher moisture levels prevailed until August with the support of some additional rain events. Only in the plot with topsoil directly applied and the shallow rock cover plot (plots A and B) sufficient water was deep draining to be sampled using the suction plates. The throughflow rate was significantly higher in directly topsoiled plot.

Overall, the moisture levels are quite low for the plots which contain a rock layer as part of the cover design and the dry conditions reach as deep as 0.4m for the shallower plots and to 0.7m for the highest cover profile (plot D). Equally, the soil water potential as a measure for the possibility of plants to extract water from the soil is very low for these depths. Only the shallow rock layer plot (plot B) with 0.4m of constructed cover may contain sufficient amounts of water for plants to avoid more severe drought conditions. Only the plot with direct application of topsoil onto tailings showed relatively moist conditions throughout the monitoring period.

The salinity levels expressed as electrical conductivity (EC) showed a continuous declining trend since installation of the trial. While this may not be unusual for the plots with a rock cover as part of the cover design, even plot A with soil directly applied on tailings showed a steady decline of EC to values less than 30µS/m in the topsoil and a reduction from >200µS/m to <70µS/m in the tailings transition zone.

These results are supported by topsoil tests on samples taken in three depth intervals close to the soil surface. All samples show a decline of salinity for the first sampling depth to 2cm from the surface, which indicates that the plots are approaching an equilibrium in the chemical conditions since construction. The EC of the top layer of the topsoil of plot A diminished from about 800µS/m to about 110µS/m within 0.5 years. The results to date show that salts moved downward in the soil profile; no upward movement and accumulation of salts on the surface occurred. The pH values were constant at near neutral to slightly acidic levels with a trend of increase at the sampled surface depths. Further observation over time will inform this trend.

The results reflect the current situation of much drier than average precipitation conditions. In years with higher/average rainfall amounts, the moisture regime may vary strongly from the current observation.

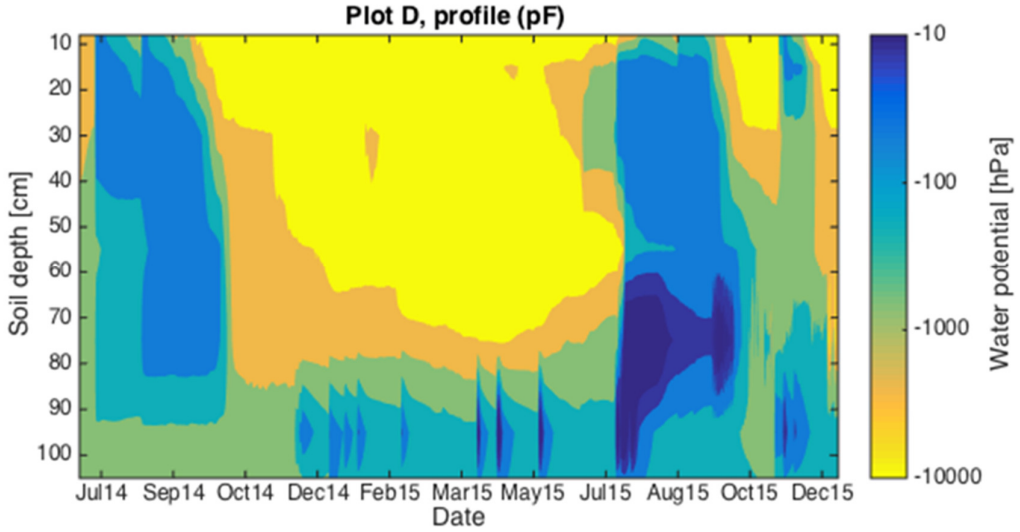

Figure 30 Water model modelling at trails plots

4.6 Actions Proposed for 2016

- Soil stripping, stockpiling and rehabilitation works associated with the approved Rosedale tailings dam
- Continue with monitoring of tailings capping trial research project

5. BIODIVERSITY AND ECOLOGY

Year summary
The following ecological projects were undertaken in 2015:

- Rosedale Project preclearance and clearing supervision surveys
- Kokoda ecological monitoring
- Pine donkey orchid monitoring survey

5.1 Rosedale project preclearance and clearing supervision surveys

As required by the conditions under the *Environment Protection and Biodiversity Conservation Act 1999*, preclearance and clearing supervision surveys were undertaken across the Rosedale Project. Preclearance surveys included assessing each individual tree within the Rosedale project area for significant habitat features, such as hollows or nests. All trees with significant habitat features were individually numbered using bright pink spray paint and recorded using GPS so they could be easily relocated during clearing supervision surveys. In addition to marking habitat features, flora and fauna surveys were conducted across the project area.

During preclearance surveys, a total of 169 significant habitat features were marked, the majority of which were trees with hollows (134 recorded), followed by trees with nests (21 recorded), stag trees (11 recorded) and hollow logs (3 recorded). One threatened species, the grey-crowned babbler (eastern sub-species) was recorded during preclearance surveys. No threatened flora species were recorded during preclearance surveys.

On the day of clearing, clearing supervision surveys were undertaken. This involved the onsite ecologist supervising the felling of all trees that were marked to have significant habitat features. Prior to the heavy machinery approaching the tree, an inspection was undertaken to identify any fauna perching or easily visible in the tree. Once the visual inspection was complete and no immediate ecological issues were identified, an excavator approached the marked tree and tapped it for a minimum of 30 seconds. The excavator then waited for a minimum of 30 seconds to allow for fauna to leave the tree. If it was evident that fauna had not left the tree, this process (shake then wait) would be repeated until all evident fauna have left the area. Once the tree was ready to be felled, the excavator operator lowered the tree as gently as possible. Once the tree was on the ground, the onsite ecologist inspected the tree for any injured fauna (including inspecting any nests) and recorded the number of hollows suitable for superb parrot were present in the tree.

Following this procedure, many fauna species were observed to leave the trees uninjured prior to felling. Species observed leaving trees included barn owls, galahs, brush tailed possums as well as a pair of sugar gliders that were captured by suitably qualified persons (the onsite ecologist and a WIRES representative) and relocated to adjacent habitat with suitable hollows outside the impact area. During the tree felling, a WIRES representative was on call for the project at all times.

5.2 Kokoda ecological monitoring

In 2015, a range of baseline ecological field surveys were undertaken across the Kokoda Offset Site, including:

- Floristic data using plot-based surveys
- Landscape Function Analysis (LFA) monitoring
- Targeted bird surveys in winter and spring

5.2.1 Floristic data using plot-based surveys

A total of seventeen 20 by 20 metre permanent flora sampling sites (plots) were undertaken at Kokoda in 2015. The location of survey sites were selected to represent the different vegetation communities mapped by Umwelt in 2013 and were marked for ease of relocating for subsequent monitoring surveys (using a handheld global positioning system (GPS) and star pickets). Photographs were also taken at each site to help monitor changes over time.

During surveys, total floristic diversity was recorded in systematic increments within the monitoring plots, beginning at the start of the LFA/ vegetation transect in the 1 x 1 m sub-plot. Total shrub counts were made within the shaded 10 x 20 m subplots and mature tree counts and condition variables were made within the entire 20 x 20 m quadrat. For more information on the methodologies used to conduct the flora surveys, refer to Ecological Monitoring Report.

Floristic plot-based survey at Kokoda recorded 166 plant species; including 41 non-native (weed) species and 125 native species. No threatened flora species were detected in the flora plots during field surveys. For more information on the floristic diversity at Kokoda, refer to Ecological Monitoring Report.

5.2.2 LFA monitoring

For information on LFA monitoring undertaken at Kokoda during 2015, refer to Ecological Monitoring Report.

5.2.3 Targeted bird surveys at Kokoda

Targeted bird surveys were carried out at Kokoda Offset Site in winter and spring 2015. Bird surveys were conducted at six sites across two days in winter and 12 sites across four days in spring. Surveys consisted of 2 x 2 ha area searches for 20 minutes in suitable habitat within Kokoda.

All bird surveys undertaken at Kokoda in 2015 were undertaken by a minimum of two people. During targeted bird surveys, all birds seen (using binoculars) or heard (using diagnostic calls) were recorded. Targeted bird surveys were undertaken twice at each survey site, in most cases once in the early morning and once in the afternoon (specifically between sunrise and 10:30 am and between 3:00 pm and sunset) when birds are most active and vocal to maximise detectability. Any opportunistic bird species identified during surveys were also recorded.

During targeted bird surveys at Kokoda in 2015, a total of 42 bird species were recorded during winter and a total of 53 bird species during spring. During surveys in 2015, four threatened bird species were recorded at the Kokoda. These included:

- Brown treecreeper (eastern subspecies) (*Climacteris picumnus*)- observed during winter surveys only
- Super parrot (*Polytelis swainsonii)* (EPBC: V/ TSC: V)- observed during spring surveys only
- Diamond firetail (TSC:V) (*Stagonopleura guttata*)- observed during spring surveys only
- Grey-crowned babbler (eastern sub-species) (*Pomatostomus temporalis*)(TSC-V)- observed during winter and spring surveys

The grey-crowned babbler (eastern subspecies), diamond firetail and brown treecreeper (eastern subspecies) are sedentary species; therefore, these records are likely to indicate that populations of each species occurs within Kokoda. However, the superb parrot is nomadic species and likely to only use the site for foraging during eucalypt flowering.

In addition, a number of species listed as marine and/ or migratory under the EPBC Act were recorded during surveys in 2015. These included:

- Australiasian pipit (*Anthus novaeseelandiae*)(listed marine)- observed during spring
- Black-faced cuckoo-shrike (*Coracina novaehollandiae*) (listed marine)- observed during winter and spring
- Welcome swallow (*Hirundo neoxena*) (listed marine)- observed during winter and spring
- Magpie lark (*Gracilla cyanoleuca*) (listed marine)-observed during winter and spring
- Rainbow bee-eater (*Merops ornatus*) (listed marine, migratory (JAMBA))- observed during spring
- Whistling kite (Haliastur sphenurus) (listed marine)- observed during spring
- Tree martin (Petrochelidon nigricans) (listed marine)- Observed during winter
- Pallid cuckoo (*Cuculus pallidus*) (listed marine)- Observed during winter

5.3 Pine donkey orchid population monitoring

Field surveys of the two populations of the pine donkey orchid (*Diuris tricolor*) associated with the Northparkes Mine mining lease was carried out on 20 and 22 November 2015. Populations were surveyed within the following two pine donkey orchid management zones:

- E48 Subsidence zone
- Adavale lane

The survey comprised marking the locations of each individual plant encountered along the walking transect, using a GPS-generated point. Transects were generally between 5 and 10 metres apart to achieve comprehensive spatial coverage of each population, with the aim of locating every individual orchid visible.
One hundred and eight-one individual pine donkey orchids (*Diuris tricolor*) were recorded in the two *Diuris tricolor* Management Zones surveyed in spring 2015. These included:

- 148 individual plants in E48 Subsidence Zone
- 38 in Adavale Lane

6. WASTE AND HAZARDOUS MATERIAL MANAGEMENT

Year Summary

- 40 percent of total waste recycled
- 11.5 percent increase in total waste generated from previous reporting period
- Chemical audit successfully completed.

6.1 Monitoring

Onsite non-mineral waste storage facilities are inspected on a regular basis. These inspections target non-mineral waste segregation, general housekeeping, and management of hydrocarbons and chemicals.

Northparkes undertake inspections at offsite waste disposal facilities receiving non-mineral waste from Northparkes. Frequency and detail of these inspections are based on the level of risk associated with that waste stream.

Northparkes also undertakes an annual chemical audit on-site which reviews the usage, storage, labelling, quantities, MSDS availability, and approval to be on-site. All chemical approvals are managed on-site via the ChemAlert database.

In March 2015, Northparkes engaged third party auditors to undertake internal audit for licence conditions. As part of the audit, all waste management areas were inspected and no actions were identified.

6.2 Management

Northparkes mining and processing activities generate non-mineral waste such as tyres, waste hydrocarbons, batteries, steel and domestic rubbish. Northparkes waste management hierarchy is to eliminate, reduce and recycle where possible and set internal targets to drive this behaviour.

A site wide non-mineral waste management system has been implemented at Northparkes. The system is managed by waste management specialists and includes the following:

- Provision of suitable waste receptacles
- Collection and disposal of waste materials
- Waste tracking and reporting
- Awareness training
- Identification of improvement opportunities

The system aims to minimise waste generation, and maximise reuse and recycling. This is assisted by a bin colour-coding system to facilitate non-mineral waste segregation at the source of generation. No non-mineral waste was disposed of on-site at Northparkes during the reporting period. All non-mineral waste quantities are removed offsite for disposal and are tracked and reported on a monthly basis by Northparkes waste service provider.

Northparkes manages hazardous materials through an internal approval process and the ChemAlert program. All chemicals brought to and used onsite are registered in a central database. This database contains the Material Safety Data Sheets and can be accessed at any computer terminal to provide guidance on storage, use, and disposal to personnel.

All waste bins onsite (general and recycle) bins are labelled which enables Northparkes to monitor for waste types and quantity which also provides opportunity to implement waste reduction programs onsite.

6.3 Results

Total non-mineral waste generated in the reporting period represents an 11.5 per cent increase from the previous reporting period. This is largely attributable to a reduction in the production of scrap steel (i.e. used grinding material) generated by Northparkes Ore Processing, Underground and the completion of the Tunnel Boring Project. The quantity of general waste produced was more than the recyclable waste and thereby there was a decrease in recycling percentage from the last year.

Minor improvement opportunities were sighted in individual workplaces predominantly associated with the clearness of signage.

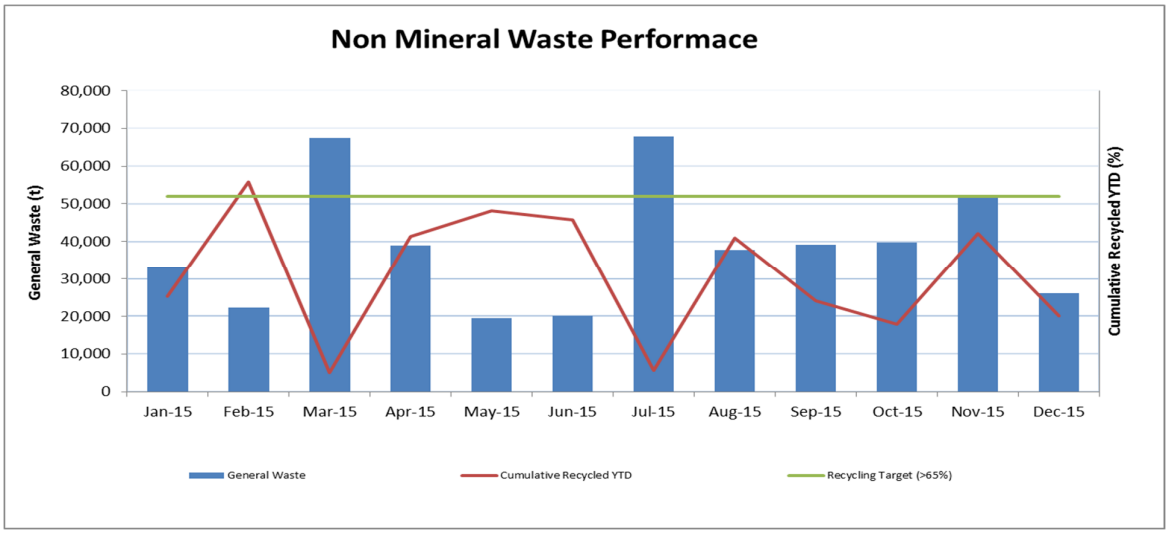

Figure 31 Non Mineral Waste Performance

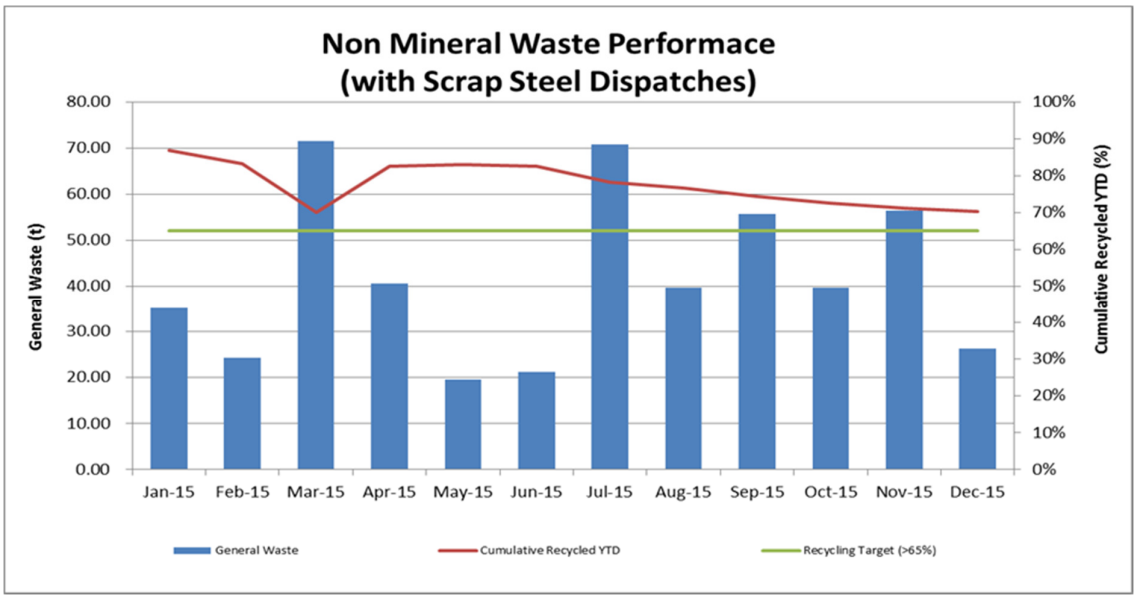

Figure 32 2015 Scrap steel performance

6.4 Actions Proposed for 2016

- Continue and implement opportunities for waste recycling, re-used and reduction
- Training and awareness sessions for Northparkes personnel and contractors
- Investigate sources and methods for onsite hydrocarbon waste treatment (landfarm treatment)
- Investigate the use of incinerator for hydrocarbon spill waste disposal methods
- Environmental audit of Remondis Newcastle waste recycling facility and Southern Oil Wagga Wagga oil recycling plant

7. TAILINGS AND MINERAL WASTE

Reporting period summary

- 5.88 million tonnes of tailings deposited
- 64,652 tonnes of waste rock deposited on waste dumps
- Dust mitigation trails on TSF1 and TSF2 using vegetation growth medium and chisel ploughing

Northparkes currently has three TSFs on-site, TSF1, TSF2 and Estcourt TSF, which incorporated in-pit deposition into a former open cut pit E27. TSF1 is currently at capacity, with approval for an additional wall lift of four meters. Active tails deposition is occurring in TSF2, Estcourt TSF and E27.

Northparkes also has a number of waste dumps on-site (Figure 33), one of which is currently being utilised primarily to accommodate waste material from on-going underground development.

Figure 33 Existing ore, waste rock dump and stockpile locations

7.1 Management

7.1.1 Tailings

A total of approximately 100.2 Mt of tailings has been deposited at Northparkes operations to date. All tailings have been deposited within TSF1, TSF2, E27 pit and Estcourt TSF located approximately 2km from the processing plant. The tailings are sub-aerially deposited into the active TSF and tailings liquid and runoff is contained and directed to the internal central decant tower.

The TSFs have been designed to provide:

- Safe and permanent containment of all tailings solids
- The recovery of free water for reuse within the processing plant
- Containment of all water under extreme rainfall conditions
- Maximised structural strength through the deposited tailings
- Containment of all chemical residues

Northparkes control measures for the management of tailings during construction and operation are implemented as per the Tailings Operators Manual.

The site tailings strategy is regularly reviewed, with the most optimal disposal strategy utilised. The future tailings deposition strategy involves alternating deposition between the E27 pit, Estcourt TSF and TSF2. Seepage remediation works were commissioned on TSF2 to realign the seepage drainage channels on the Northern Wall of TSF2.

7.1.2 Waste Rock

Geochemical tests of waste rock are conducted for underground activities to determine the nature of the material prior to excavation for disposal onto a surface dump or stockpile. Waste rock and clay across the operations are stored in either stockpiles or dumps, as detailed in Figure 33.

Generally underground waste rock has been placed in the E26 Lift 1 Mullock Stockpile. Mineral waste is reused for construction activities. An additional clay dump was constructed to the east of the E26 subsidence zone to store pre-strip material from above the E26 ore body.

Within the constraints of mineral waste management practices these waste dumps and stockpiles may be utilised for construction purposes such as TSF walls, TSF capping, or as road base.

7.2 Monitoring

7.2.1 Tailings

Northparkes maintains an extensive monitoring program to manage impacts associated with tailings storage. Anomalies from the monitoring program are recorded and reported internally for action.

Daily inspections monitor:

- Tailings lines and discharge spigots
- Tailings walls for any breaches, cracks or structural changes
- Water levels in the retention ponds, TSFs, decant ponds, sediment ponds, and stilling ponds
- Pump and pipeline integrity from the plant to the TSF
- Rainfall measurements
- Density of tailings stream

Weekly inspections monitor:

- Water pressures measured at the TSF1 and TSF2 piezometers
- Monthly inspections of the outer surface of the TSF walls monitor
- Wall stability, cracking and erosion rills
- Vegetative cover
- Seepage

Quarterly water monitoring of the surface and groundwater quality surrounding the tailings storage facilities is conducted.

The mine is currently depositing into the Estcourt TSF and E27 pit. Construction of Estcourt TSF was completed and commissioned during 2012.

All construction work on TSF1 and E27 pit was completed in 2009, with minimal repairs in the current reporting period with the exception of TSF2 where seepage remediation works were undertaken on the Southern Wall.

Erosion of TSF1 and TSF2 drop structures continued to be monitored as part of routine surveillance inspections.

Mineral waste monitoring includes a monthly composite sample of the tailings slurry. The sample is sent for full sulphide and mineralogical analysis to determine plant efficiencies and chemistry of the tailings.

7.2.2 Waste Rock

Northparkes undertakes testing programs to characterise the nature of rock material considered waste from the mining process. Northparkes engaged external consultants to undertake the Geo-Chemical assessments on waste rocks and tailings to assess the potential environmental risks posed by waste rocks. The works include characterisation of waste rock and tailings generated during mining, as well as rock located in the area of subsidence associated with the mined out ore body.

The samples were submitted for the following tests

- Paste pH and EC
- Total Sulphur
- Acid Neutralising Capacity (ANC)
- Net Acid Generation (NAG) test
- Multi-Element Chemical Assay

Results indicate that the primary waste rocks from the ore bodies are low in sulphur with high acid-neutralising capacity and a negative net acid-producing capacity.

Solubility analyses and leachate tests showed that potentially toxic elements are not mobile at the natural pH of the waste rock and elevated levels are not expected in leachates or pore water. Using a conservative management approach, waste rock is tested for its acid forming potential even though acid rock drainage does not pose a significant risk for the operations.

Tailings sample indicate low total sulphur content with moderate acid neutralising capacity. All tailings are high content of gold, copper and selenium compared to average crustal abundances.

The Environment team regularly inspects the waste rock dumps for density of vegetative cover, slumping / movement, weed growth, erosion, and drainage lines.

7.3 Results

7.3.1 Tailings

In the reporting period, 5,883,482 tonnes of tailings were deposited between Estcourt and TSF2.

7.3.2 Waste rock

A total of 64,652 tonnes of waste rock from underground development was placed on the Lift 1 Mullock Dump during the reporting period. This was primarily from the Brazen, Discovery and Conviction development drives.

The waste movement for this reporting period decreased from the previous reporting period due to the completion of construction activities of the Estcourt TSF.

No significant issues were identified from the inspections of waste rock dumps across site in the current reporting period.

7.4 Actions proposed for 2016

- Feasibility study for TSF1 closure
- Investigation further options to manage the tailings dust intern

8. CULTURAL HERITAGE

Reporting period summary

Aboriginal Heritage Surveys were completed as required. There was an increase in the number of Cultural Heritage surveys completed during the reporting period due to the Rosedale Tailings Project. This required the clearance of previously undisturbed land. A significant area of the tailings footprint was surveyed by the cultural heritage specialist, as appointed and approved by the Wiradjuri Executive Committee (WEC). The WEC worked closely with the Project team to complete the required works without incident.

8.1 Monitoring

The location of the Aboriginal cultural heritage sensitivity zones are identified in Figure 34.

Monitoring includes:

- Checking the accuracy of information recorded on the land management system
- Inspecting protected Aboriginal cultural heritage sites to ensure there is no damage (prior to salvage)
- Auditing the site disturbance process and approvals to ensure that all appropriate archaeological assessments have occurred
- Reviewing the training program to ensure relevant staff have received Aboriginal cultural heritage training

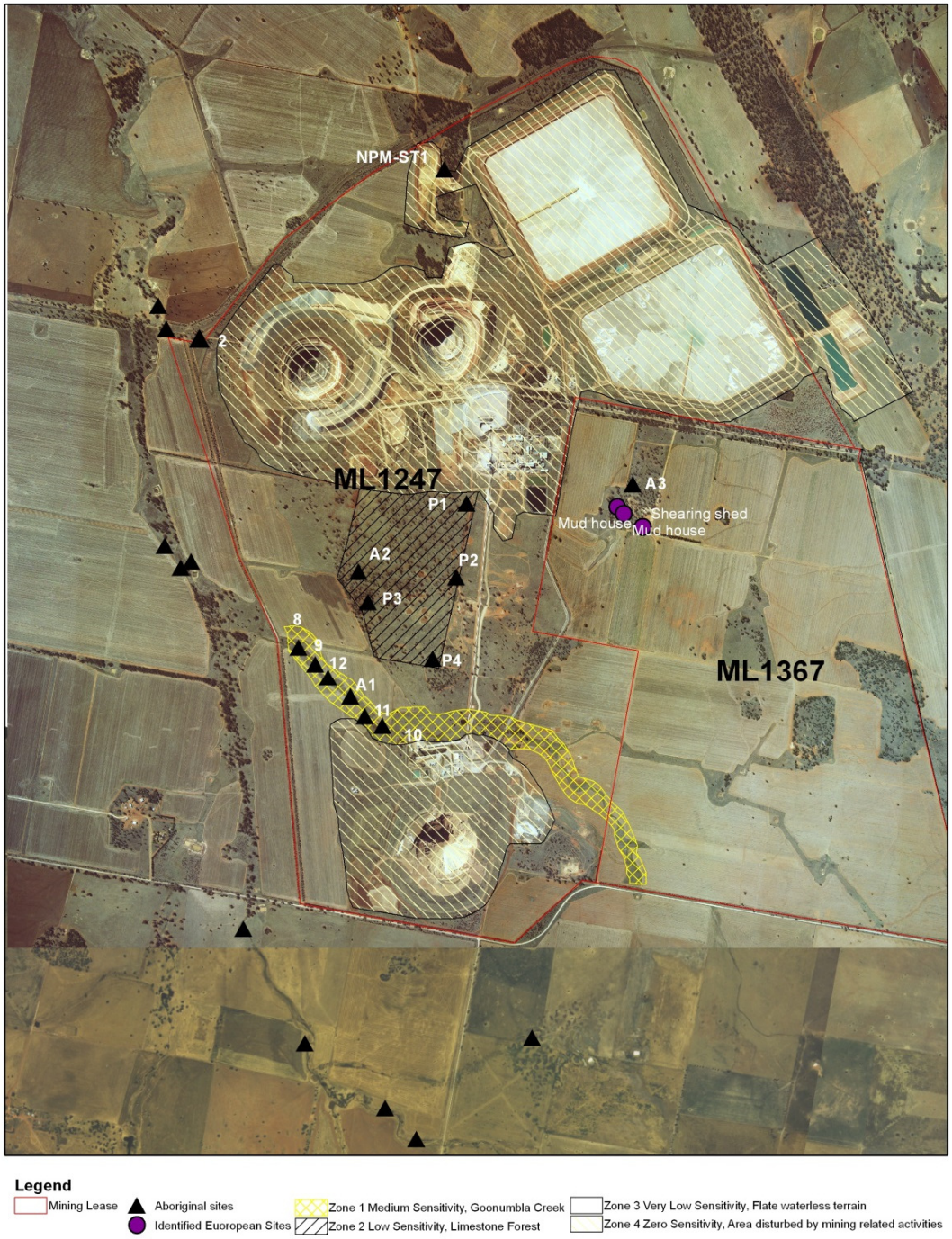

Figure 34 Aboriginal cultural heritage sensitivity zones

8.2 Management

Northparkes has implemented an Aboriginal Heritage Management Plan (AHMP) that provides the framework for the identification, assessment, monitoring and management of Aboriginal cultural heritage on site.

In accordance with the AHMP, the WEC met on a regular basis throughout the reporting period, with four meetings held in March, June, September and November respectively. The WEC is a consultation forum to enable appropriate review of the current Northparkes Aboriginal heritage management practices and identify potential improvement opportunities in the community. The WEC reviews all Site Disturbance Permits (SDP) at their quarterly meetings.

Northparkes utilises a SDP approval system to manage the protection of heritage sites on the mine lease. This approval process applies to activities planned in previously undisturbed areas or previously rehabilitated areas. The area to be disturbed is compared to the Aboriginal cultural heritage sensitivity zones to determine the need for additional survey work or salvage work prior to starting the project.

8.3 Results

Works undertaken by the WEC in the reporting period included:

- Review of all site disturbance permits issued by Northparkes at regular meetings
- Participation in selecting Northparkes Indigenous Scholarship recipients
- Review of and support for the Strong Young Mums sponsorship program
- Preparation of draft work plans for 2016

8.4 Actions Proposed for 2016

- Continue quarterly WEC meetings
- Timely review of SDPs and opportunity to suggest possible improvements
- Support the Northparkes Indigenous Scholarship Program by identifying candidates and providing input during the program
- Explore opportunities for indigenous procurement and business development (2016 Work Plan)
- Raise employee awareness and knowledge of Cultural Heritage (2016 Work Plan)

9. COMMUNITY RELATIONS

Reporting period summary

The Northparkes Stakeholder Management Plan guides Northparkes' relationship with the community in which it is licensed to operate. The Plan aims to address the various and, at times, diverse needs of Northparkes' stakeholders: employees, community and government.

During 2015, Northparkes:

- Expanded stakeholder relationships, worked closely with the community and proactively addressed priorities and concerns
- Participated in community initiatives such as the Anzac centenary, White Ribbon Day and the Parkes Show
- Invested in the future of the community through meaningful partnerships in the order of $381,000
- Provided in-kind community support to community groups through the Central West via its award-winning Volunteer Leave Program. Northparkes employees volunteered 1047 hours in the reporting period.
- One community complaint was reported to Northparkes during the year

Northparkes recognises the importance of positive relations with its community and takes this into account in the operation of its business and the decisions made.

9.1 Community engagement

Northparkes engages directly and regularly with the local community to both understand community issues and to keep the community updated about activities relating to Northparkes' operations.

The Northparkes Community Consultative committee (CCC) was established in 2006. The CCC provides an open forum to discuss any issues relating to Northparkes and its impact on the local community. The CCC comprises approximately seven community members and three Northparkes personnel. Two meetings were held in the reporting period in April and September. No significant issues were raised during the meetings held with the community during the reporting period.

A separate subcommittee helps Northparkes make decisions regarding sponsorship requests from the local community, as part of the Northparkes Community Investment Program.

Northparkes respects the need for regular communication with its nearby neighbours. Neighbours meetings are typically held with Northparkes' closest neighbours biannually to provide consultation and feedback in regards to mining activities.

Two regular Neighbours Meetings were held in the reporting period in March and October. During the year Northparkes also held an extra meeting to provide an additional opportunity to consult its neighbours about the construction of the new Tailings Storage Facility. The Rosedale Tailings Project is a significant project and, as such, meant that additional consultation with neighbours was necessary during 2015.

The Project had external impacts including road changes, with the construction of a new access road to site (known as Northparkes Way). This element of the Project had the potential to impact several of Northparkes' closest neighbours. However, regular and open consultation, including formal and informal meetings, ensured that the new access road was built to withstand 100-year floods and is of the highest standard possible. This addressed concerns raised by neighbours and ensured the best possible outcome for both Northparkes and the community.

In June, Northparkes distributed its annual Sustainable Development Report to key stakeholders. This Report was also shared on the website and made available to all employees.

The "Source" community newsletter was distributed twice during the reporting period with positive feedback from community members on the content, design and intent of the newsletter. The first edition of the "Source" was delivered to approximately 12,000 residents across the Parkes and Forbes shire council areas via mailbox drop. The second edition, which included a new-look design for the newsletter, was distributed via insert to the Parkes Champion Post and Forbes Advocate.

Northparkes launched a Facebook page in 2014, which was used actively as a two-way communication channel by both Northparkes and the community in 2015.

9.2 Contributions and achievements

In line with its commitment to support a sustainable community, Northparkes has an investment program to manage financial support for local community events, committees and schools. This program encompasses a small number of carefully considered donations, the Northparkes Community Investment Program and partnership programs.

In 2015, Northparkes continued to provide financial assistance to local organisations that deliver benefits to the community. Approximately $381, 000 was invested in various sporting, educational, cultural, environmental and agricultural programs.

This funding was complemented by the nationally recognised Northparkes Volunteer Leave Program. This program allows Northparkes employees to volunteer for two days each year to help community groups throughout the Central West. Employees receive time in lieu if volunteering takes place outside of work hours. During the reporting period employees donated 1097 hours to groups and projects throughout the Central West.

The major initiatives in the current reporting period programs included:

- 148 employees participated in 32 volunteering initiatives, which included helping prepare for local agricultural shows, packing hampers with the Salvation Army, first aid training at Parkes High School and assisting with the Trundle Bush Tucker day. This represented 1047 volunteer hours.
- A Grants Officer Program in conjunction with Parkes Shire Council
- An Aboriginal project officer in conjunction with Parkes Shire Council
- A Sports Grant Program with the Parkes Shire Council
- Five-year partnership with CentaCare – Strong Young Mums (2015 marked the third year in this commitment)
- Supporting Lachlan Health Services via a Palliative Care partnership
- Supporting education through the Peer Tutoring Program at Parkes High School and Parkes Life Education Program

- A community equipment pool which provides community groups access to equipment such as marquees, a blow up TV screen, a PA system, eskies etcetera for use free of charge
- Sponsorship of the Parkes Elvis Festival
- Sponsorship of the Forbes Vanfest music festival

Northparkes held the 2015 Open Day in May. This was the first time this event was held offsite - in Parkes at the Northparkes Oval. The day was an opportunity to showcase what happens at Northparkes each day. By taking the event to Parkes it provided opportunity to make the day more community focused. It was the highest attended Open Day on record and has since been awarded the Community Event of the Year at the 2016 Parkes Australia Day awards.

9.3 Complaints

9.3.1 Management

Northparkes has a process for receiving, investigating, responding and reporting complaints received from community members. A 24-hour external telephone line (02 6861 3000 - Option 2) is in place to allow the public to raise community concerns. This contact number is advertised in the local telephone directory, six-monthly in the Source newsletter and on the Northparkes website (www.Northparkes.com). This website also provides information about all aspects of Northparkes operations, and has a facility for the community to submit enquiries, concerns or complaints via e-mail direct to the Community and External Relations team.

All complaints received across site are referred to the Community and External Relations team, and are then responded to in a professional and timely manner. All complaints are recorded, with the outcomes of investigation findings and corrective actions communicated to the relevant personnel and reported in the AEMR and the annual Northparkes report.

During the reporting period Northparkes received one complaint from a community member relating to radio communication (Table 15).

As dust management is a high priority for Northparkes, during the reporting period a new consultation system with neighbours in relation to dust was implemented. The Northparkes Environment team distributes a weekly weather report, internally. If there is a high risk dust day, the Community and External Relations team sends an advance text message to any neighbour who may be affected. The message includes information about the expected high risk day and any mitigating actions Northparkes plans to take, as well as the invitation to call the team if people have concerns or questions. This process worked extremely well and will be continued into 2016

9.4 Results

Table 15: complaints received in 2015

Issue	Date	Details
Radio Communication	24.09.2015	A complainant called Northparkes to raise a concern over the language being used on the UHF channel being used on the Rosedale Tailings Project. Northparkes ran education sessions with the operators around appropriate communication and radio use onsite.